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A DISSERTATION

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in partial fulfillment of the requirements for the

Degree of

DOCTOR OF PHILOSOPHY

By

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THE EFFECTIVENESS OF INDUSTRY ADVISORY BOARDS
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A DISSERTATION APPROVED FOR THE
SCHOOL OF INDUSTRIAL ENGINEERING

BY

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ABSTRACT

The use of voluntary advisory boards composed primarily of industry practitioners to give aid and advice is almost universal in engineering education programs. The goals, operation, and composition of advisory boards have significant variation across programs. Some schools have established valued and effective advisory boards while others struggle with poor working relationships and difficulty accomplishing their objectives. This research develops a model of advisory board effectiveness, and through interviews and surveys validates that model and identifies common elements of effective advisory boards.

Based on the literature of organizational effectiveness, a model of advisory board effectiveness is proposed. This model suggests that effectiveness should be considered in four dimensions – Human Relations (the working relationships within the board), Internal Process (the internal operating systems needed for board operation), Rational Goal (the goals and objectives of the board), and Open Systems (the interaction of the board with the surrounding world). The research validates this model and supports its usefulness as a framework for understanding and improving advisory board operation.

Interviews with school leadership and board members from two engineering programs, along with observation of board meetings and review of documents, led to a case study in which the operation of an effective advisory board was examined. In addition, a survey was sent out to school directors and board members at engineering programs across the United States asking for information regarding the effectiveness, operation, and composition of their advisory boards. The case study and survey analyses

led to a series of conclusions regarding the common elements of advisory board effectiveness.

Effective boards are characterized by strong leadership, both from the school director and board chair. These boards tend to have membership typified by individuals with relevant work experience, a strong desire for involvement with the program, and close ties to the school. A high percentage of members are typically alumni of the program. Membership represents a diversity of industry and work experience, though not to the extent that members feel uncomfortable in the board environment. Board operation encourages engagement of board members with students, provides opportunities for socialization between board members and with faculty, and has formal procedures for involvement of the board in the ABET accreditation process. The school maintains open and candid communication with board members and consistently follows up on actions from the board. Advisory board activities are coordinated with the rest of the college or university.

Significant differences are seen between programs in the role of the advisory board with respect to fundraising. Some programs deliberately do not involve the board in any aspects of fundraising, while others use the board very successfully in this role. For some programs, however, fundraising is a source of conflict and frustration. Boards can be effective with or without involvement of board members in fundraising, but it is essential that expectations in this area be clearly understood and agreed upon by the school and the board.

CHAPTER 1: INTRODUCTION

1.0 Summary

This dissertation is a report on an investigation of the effectiveness of industry advisory boards in engineering education. The introductory chapter will give the background of the study and its significance within engineering higher education, indicate the problem under investigation and related research questions, and give an overview of the methodology used in the study.

1.1 Background

The use of voluntary advisory boards composed of practitioners from the professional workplace to give aid and advice to an educational program is common across most university academic divisions, regardless of their field of study. The vast majority of universities offering accredited degree programs in engineering have established some form of advisory structure composed of practicing or retired professionals who are called upon to help support the educational program in a number of ways. This structure is referred to in a variety of ways, including “board”, “council”, or “committee”, and the members may be called “advisors”, “visitors”, or “associates”. This study will use the general term “Industry Advisory Board” (IAB).

The widespread existence of these advisory boards in engineering education began in the 1970’s, but a significant proliferation in their use and increase in their significance has come about in the last six or seven years since the introduction of the EC2000 engineering accreditation process by ABET (Accreditation Board for

Engineering and Technology). ABET is the primary United States accreditor of college and university programs in engineering, science, and technology, and many educational programs have turned to advisory boards to help satisfy the new requirements of this accreditation protocol.

1.2 Significance of the Study

While the use of advisory boards to support engineering higher education programs is common, there is relatively little written and (to the author's knowledge) no comprehensive research on what it takes to establish and operate an effective advisory program. The goals, operation, and composition of advisory boards have significant variation across programs. Some programs seem to have established valued and effective advisory boards, with excellent working relationships with the program, while other boards could be described as non-functional or dysfunctional. Programs may find that some aspects of the advisory board relationship are working well, while other aspects are struggling. The objective of this research is to develop a model of advisory board effectiveness, identify the underlying differences between effective and ineffective boards, and offer guidance on the key elements that constitute an effective advisory board relationship. The findings and recommendations are based on research covering a large number of engineering programs across a number of educational institutions.

1.3 Problem Statement and Research Questions

The broad goal of this research is to answer the question "What does it take to establish and operate an effective industry advisory board in engineering education?" To

help answer this larger question, four research questions are proposed, all in the specific context of advisory boards in engineering higher education.

- How is overall effectiveness defined and assessed?
- What are the elements that make up effectiveness and how are they measured?
- What are the factors that influence effectiveness?
- How does board member selection influence effectiveness?

The first research question looks at a top level view of effectiveness, and examines how different programs define and assess effectiveness. It is anticipated that each program will have different priorities, values, and institutional culture that will result in different effectiveness constructs. This question looks for common patterns and differences across the effectiveness constructs.

The second research question looks at the specific elements that make up the higher level construct of effectiveness. These elements are examined in the context of a general model of advisory board effectiveness. While each program may combine the effectiveness elements in different ways with different values and priorities, it is anticipated that a common list of effectiveness elements will emerge, and that each of these elements can be defined, analyzed, and measured.

Whereas research question two looks at the output of the advisory board process (dependent variables), research question three focuses on the factors that control the process – the input or independent variables. For each output element that makes up the effectiveness construct, this question examines which input factors are the most significant in influencing or controlling that element.

Research question four is a focused extension of research question three regarding factors that influence board effectiveness. It is anticipated that the membership

composition of the board will have a significant influence on the operation and effectiveness of the board, and this question probes this aspect more specifically.

A general model of industry advisory board effectiveness is proposed, based on the literature and theory of organizational effectiveness. It is seen that answering each research question in large part validates an element of the model.

1.4 Research Methodology Overview

The research methodologies used are both quantitative and qualitative, depending on the research phase. The first phase is approached as a qualitative case study, investigating two engineering advisory board programs at the University of Oklahoma. Interviews were conducted with selected individuals in educational leadership, advisory board leadership, and advisory board members. Also included are observation of board meetings and document reviews of instruments such as charters, agendas, and meeting minutes from participating programs. Informed by the first phase of the research, the second phase is a larger scale quantitative survey of educational institution leadership, advisory board leadership, and advisory board members in engineering institutions across the United States. Analysis of survey results looks for common patterns and relationships within effective advisory board programs.

CHAPTER 2: A SURVEY OF THE LITERATURE

2.0 Summary

This literature review starts by looking at advisory boards in education in general, including a brief look at the history of the use of advisory boards in education. The roles, responsibilities, and membership of boards are examined, along with what the literature says on assessing and improving board effectiveness. The review then focuses on the use of advisory boards in engineering education in particular. The literature on engineering advisory board purpose, roles, and responsibilities is summarized, along with a more detailed look at the role of advisory boards in program accreditation. Board membership, structure, and operation are examined, followed by literature on the factors that influence engineering advisory board effectiveness. The study then examines literature on organizational effectiveness theory, with particular emphasis on models of organizational effectiveness.

2.1 A History and Overview of Advisory Boards in Education

Citizen and community participation in education encompasses a wide range of ideas, programs, issues, and mechanisms that impact almost every aspect of the educational system. The advisory board or committee has emerged as one of the primary mechanisms to provide external input that affects the policies, content, and direction of the total educational program (Cochran, Phelps, & Cochran 1980).

Citizen involvement in the educational system has roots as far back as the apprenticeship programs developed by guilds in the Middle Ages. Colonial officials in

New England called upon appointed committees of fellow citizens to make recommendations and review proposals to help ensure literacy in the fledgling colonies. It was in the area of vocational education, however, that formal school-initiated advisory committees gained the earliest significant use. The earliest proponents of vocational education recognized the importance of having a close working relationship between education, business, industry, and agriculture to ensure that programs met local employment needs. Records of advisory committees in agricultural education, for instance, can be traced back to 1911 (Cochran, Phelps, & Cochran 1980).

While the value of advisory committees was recognized as part of the early philosophy of technical and vocational education, in practice they tended to be used sparingly throughout the first half of the 20th century. With the additional emphasis on technical education that came as part of the space race and cold war of the 1960's, however, the federal government began to mandate increased use of advisory boards. In 1961, President Kennedy formed the President's Panel of Consultants of Vocational Education. As a result of this study, the 1963 Vocational Education Act and its 1968 amendment created the National Advisory Council of Vocational Education and mandated the creation of state level advisory councils. Further legislation in 1976 required the formation of local advisory committees if districts were to receive federal funding (Cochran, Phelps, & Cochran 1980).

The amount of research pertaining to advisory committees prior to 1968 is quite limited. The passage of the Vocational Education Amendments in that year sparked a significant increase in research in this area, with much focused on vocational / technical education and community colleges which experienced a significant growth in this period.

While advisory boards or committees in education are diverse in membership, roles, and structure, there is a generally accepted definition:

“An advisory committee is a group composed primarily of individuals outside the educational profession who are selected from segments of the community collectively to advise educational personnel regarding one or more educational programs or aspects of a program.” (Cochran, Phelps, & Cochran 1980, 4)

A definition that is more focused on advisory boards in higher education is given by Cuninggim (1985, 1):

“An advisory committee or visiting committee is a voluntary, extralegal group of advisors and/or supporters drawn together to give aid in one or usually many ways to an educational institution or one of its subunits, a professional school, a department, or a major academic division.”

Members of such committees are called by many names: “visitors”, “associates”, and “advisors” being the most common. The group as a whole may be termed a “council”, “board”, or “committee”. Full titles could be any combination of the preceding, such as “Board of Visitors” or “Advisory Committee”. The term “advisory board” is used in this study.

It is important to understand that the advisory board in higher education is a voluntary and extralegal entity, not a second governing board or rival to the trustees. It should also not be confused with broader “cheerleading” organizations such as the alumni association or booster’s club, as it is intended for use as serious academic tool by the institution.

2.2 Roles, Responsibilities and Membership of Advisory Boards

There has been much written about the role of advisory boards in education in general. Every source proposes its own list of activities or objectives for an advisory board.

The most common activities for an advisory committee, according to Kerka, are curriculum and instructional guidance, program review, recruitment and job placement, student organization support, staff development, community and public relations, resources, and legislation (Kerka 2002). In a survey of vocational education programs in Virginia, Ramey (1975) notes the following activities in order of priority: public relations, course content review, resource support, program review, occupational and community surveys, equipment and facility planning, student counseling and placement, and staff hiring. Cuninggim (1985) lists seven major purposes: strengthening the academic program, improving internal management of the school, program and performance evaluation, recruitment of personnel, fundraising, public relations, and improving school relationships inside and outside the institution. Cochran, Phelps, and Cochran (1980) list seven goals for an advisory committee – assessment and review, change agent, communications link, direction setting, legislative input, needs determination, and service – and groups advisory committee activity into seven functions: curriculum content advisement, resource review, community resource coordination, career guidance and placement, program evaluation, community public relations, and professional development.

Five common themes emerge which appear to be the major roles of educational advisory boards in general. This is in many ways an overly simplified and idealistic list of objectives and there are often significant obstacles to accomplishing these purposes.

1. Curriculum and instruction content review and advice

Boards are typically asked to review the curriculum and instructional content of educational programs to help ensure that graduates are adequately prepared to meet the needs of society in general and business and industry in particular.

2. Program health and development

Board members engage with the educational program to help define the goals and purposes of the program and to evaluate how effectively the program is accomplishing these objectives. Board members can bring an outside perspective, specific expertise, and business and organizational skills which can help in improving the operation of a program.

3. Resource support (fundraising, etc)

Board members often represent a potential path for resources for the program. Members may contribute from their own financial resources, have personal or business contacts who can be tapped for resources, or represent the program in larger fundraising activities. Resources can include cash, scholarships, facilities, or equipment.

4. Program assistance

Advisory board members may be called upon to sponsor student activities, address classes, provide seminars, and help with leadership and career development. They may serve as personal mentors and advisors for students, particularly for those

entering fields in which the board member is well established. They represent their companies in hiring and help with job placement.

5. Program advocacy

Board members are often chosen because of their influence in the community, and are asked to be advocates for the program both externally (within the community and with potential students) and internally (with the school administration).

Selection of appropriate members to serve on advisory committees is generally recognized as critical to the effectiveness of the committee. Cochran, Phelps and Cochran (1980) recommend the formation of a selection committee composed of three or four members, with one being a member of the school staff. The goal is selection of members who will be active participants, able and willing to contribute significantly to the success of the educational program. Cochran et. al then list three overall criteria for member selection – successful firsthand experience in the area in which the committee will serve, the ability to devote adequate time to the committee, and character qualities such as intelligence, integrity, courage, and unselfishness. Selection criteria should include occupational expertise, peer recognition, interest in students, commitment, and diversity (Kerka 2002).

Several sources point out the need for committee members to be representative of the school and community in which they serve. Cochran et. al (1980) recommend that the selection committee develop a profile of the community and make sure that industry of various sizes, labor and management, program graduates, civic leaders, and school staff are represented. Kerka (2002) recommends that the committee include genders, minorities, and special populations, making sure that individuals represent the

community, business, industry, students, parents, community agencies, and labor.

Cunninggim (1985) notes that advisory committee composition is generally a mix of alumni, scholars, influential laymen, and “leaders of the profession”.

Because of the requirements of time and interest from a board or committee member, many boards in support of departments or colleges are made up largely of graduates or alumni of the educational institution (Hughes 2001). Alumni tend to be less critical than non-alumni members, and some boards have requirements for the number of non-alumni members.

In size, advisory committees run all the way from four to sixty, with the average being twelve to fifteen, “... small enough to engaged, large enough to get things done” (Cunninggim 1985, 3). Member terms may be from two to five years and may or may not be renewable, or terms may be unspecified. Frequency of meetings may be as often as once a month (Cochran, Phelps, & Cochran 1980), but more generally once or twice a year. Meeting schedules vary considerably, with a few advisory committee meetings as long as two days. More often, meetings occupy one day or a part of a day.

2.3 Assessing and Improving Board Effectiveness

If the scope of study is expanded to include advisory boards and boards of governance of all types in the nonprofit sector, there is quite a lot of research on the topic of assessing and improving board effectiveness. There has been a steady growth in the last 20 years of training programs, consulting, research, and guidebooks aimed at improving the performance of nonprofit boards (Ryan, Chait, & Taylor 2003). Tools are readily available to help in assessing effectiveness. The Corporate Fund, for example,

has a downloadable evaluation instrument called the “Non-Profit Board Self Assessment Kit” (“Board Self-Assessment Kit” 1995) and Gill, Flynn, and Reissing (2005) describe the “Governance Self-Assessment Checklist”. Cunningham (1977) summarizes seven different strategies or models that have been developed for assessing organizational effectiveness in different situations.

Holland and Jackson (1998) identify six dimensions of board competency – *contextual* (taking into account the culture, values, mission, and norms of the organization), *educational* (being well informed about the organization and roles and responsibilities), *interpersonal* (development of members as a group and attending to collective welfare), *analytical* (recognizing the complexities and subtleties of issues), *political* (developing and maintaining healthy relationships with key constituencies) and *strategic* (helping envision and shape the institutional direction). Their data suggests that weakness in the educational dimension is a common problem for most boards.

Ryan, Chait, & Taylor (2003, 1) describe three board performance problems that appear most prevalent:

“First, dysfunctional group dynamics – rivalries, domination of the many by the few, bad communication and bad chemistry – impede collective deliberation and decision making. Second, too many board members are disengaged. They don’t know what’s going on in the organization, nor do they demonstrate much desire to find out. Third, and most important, board members are often uncertain about their roles and responsibilities. They can’t perform well because they don’t know what their job is.”

The importance of clear roles and responsibilities is emphasized by many sources.

Cunninggim (1985, 16) says:

“There exists a considerable uncertainty as to the purposes of visiting committees and their priorities.... Uncertainty breeds frustration, and if schools are to keep

their committees motivated and eager, they must define and clarify their purposes in credible, conservative language.”

Cochran et. al (1980) list twenty-four operational and leadership hazards to be aware of in the operation of an advisory committee, one of which warns that committee members may not properly understand their roles and responsibilities, which may make them produce inappropriate recommendations or make them feel they are only a ‘paper committee’.

Henderson (1990, 7) notes that:

“It appears that the effectiveness of PACs (program advisory committees) is governed in large measure by the attitudes, understanding, and commitment of each participant regarding the role of the PAC, the expectations of both college staff and committee members of the PAC/college relationship, and the level of support given by college administration.”

Kerka (2002) lists several indicators of an effective advisory committee, including developing and carrying out an ongoing plan of action that has both short-term and long-term goals and objectives, having appropriate processes for recruiting and orienting members, and operating under published and reviewed policies and procedures.

In some instances, there can be a fundamental tension between an advisory board and the institution which it serves. The mere existence of an advisory body may be perceived by faculty and administration as criticism. Educators receive a great deal of advice, whether they ask for it or not, and board members may be considered uninformed or ill-equipped to offer advice of an educational nature. On the other hand, the expertise of the board in other areas may be seen as somewhat of a criticism of the educational staff competence. The advisory process may be seen as an excessive burden on an overtaxed policy system (Henderson 1990).

The topic of fundraising is often the “elephant in the room” that is clearly a major objective of many if not most advisory committees, but is generally not openly discussed. “Perhaps the purpose most often mentioned, and strangely most often denied, for any kind of visiting committee is money raising” (Cunningim 1985, 10). Invitations to committee membership often do not mention fundraising, or point out that fundraising is not a significant purpose of the committee. Euphemisms for fundraising such as “development” or “advancement” are often used. One officer states frankly: “Members [of an advisory committee] should have some philanthropic potential, either as donors or as advocates (Cunningim 1985, 12)”. Cunningim (1985, 12) states bluntly, “If money raising is a legitimate purpose for an advisory committee, it ill behooves the institution to be mealymouthed about it.”

One study of institutional effectiveness concluded that there was a positive correlation between the presence of major donors on the boards of non-profit organizations and the efficiency of the organization as measured by expense ratios (Callen, Klein, & Tinkelman 2003). While the specific applicability of this study to the case of advisory boards can be debated, it does indicate that the presence of large donors on a board can have a significant impact on the operation of the organization.

When board weaknesses are identified, specific improvement efforts can be initiated. Obstacles to improving board performance include ambiguous expectations, weak accountability, lack of clarity about what needs changing, biases from previous unsuccessful efforts at change, and discomforts from relinquishing familiar practices to try new ones (Holland & Jackson 1998). The good news is that there is evidence that intentional efforts to improve board effectiveness can be successful. Brudney and

Murray (1998) conclude, “Planned change does appear to be associated with heightened board effectiveness”. Holland and Jackson (1998) observed that most board members were more comfortable addressing instrumental or task oriented issues than they were with affective issues such as group process and interpersonal relationships. They also noted that board development is a long-term effort rather than a quick fix, and change is not a one-size-fits-all process. It proves easier to change a board’s behavior than its members’ attitudes or personalities. Brudney and Murray (1998) concluded that, if the basic problem facing the board was that the “wrong” people were on it, it was unlikely that processes typically used to improve board effectiveness would be successful.

2.4 An Overview of Advisory Boards in Engineering Education

The literature study now moves from a discussion of advisory boards in general to a more in-depth look at the use of advisory boards in engineering education. There does not appear to have been any comprehensive research on the topic of industry advisory boards (IABs) in engineering education. Rooney (2002, 16) observes, “There has yet to accrue any significant database of literature focusing on the type and level of interaction currently obtained between IABs and the programs they advise”, but there is a fair amount of published expert opinion and case study, which are reviewed in the sections that follow. The literature does not discuss the history of advisory boards in engineering education in particular. There is quite a lot of evidence of the creation of advisory boards in the 1980’s and 1990’s, and an acceleration of their use as the ABET Engineering Criteria 2000 accreditation process came into operation, as is discussed later (Rooney 2002; Summers 2002; Swanson & Phillips 1999).

There is significant overlap between the findings in the literature on advisory boards in general, and advisory boards for engineering education in particular. As a general rule, if the literature addressed advisory boards in general, the findings were reported on in the previous sections: if the literature addressed boards for engineering education specifically, the findings will be addressed in the sections to follow.

The Carnegie Foundation groups accredited U.S. institutions of higher education into eleven categories based largely on their mission (Reis 1997). Schools that have engineering programs of relevance to this study would fall in the categories of Research universities I & II, Doctoral universities I & II, Masters (Comprehensive) universities and colleges I & II, and Baccalaureate (Liberal Arts) colleges I & II. On one end of the spectrum are doctoral granting research institutions which are large programs characterized by a heavy emphasis on research, research funding, and publication. At the other end of the spectrum, baccalaureate programs offer only bachelor's degrees, and the primary emphasis is generally on teaching. As the mission of the institution changes, so too does the priority and purpose of the associated program advisory board. The primary focus of this research and the primary source of literature on engineering advisory boards comes from Research and Doctoral institutions. In 1994, there were 125 Research I & II universities, and a total of 236 doctorate granting educational institutions in the United States (*Science and Engineering Indicators 2000*).

In larger institutions in which there are differentiated departments or schools of engineering organized by engineering discipline each with distinct faculty and staff, distinct department level advisory boards generally exist which serve the specific needs of each department. In such cases, it is common that an advisory board will also exist at

the college or engineering dean level which represents all of the engineering programs at the university (Cutlip 2003). Such a board will generally be composed of more senior representatives, and will be more focused on general strategy and fundraising, and less on program specific issues. The primary focus of this study and the majority of the literature concerns the school or department level advisory function.

2.5 Purpose and Responsibilities of IABs in Engineering Education

“An appropriately organized, charged, and managed board can be a major asset to a progressive and dynamic department”, says Cutlip (2003, 1). There are several purposes noted for the creation and operation of an industry advisory board or board of visitors, and each program may have its own priorities and goals.

Cutlip (2003) starts off by noting that a key word in the title of these boards is “advisory” and reminds members that, while they provide important advice and guidance to an academic department, their primary role is advice and not governance. All of their suggestions may not be viewed as appropriate by the department chair or faculty. In some cases, advice given may not be possible or practical due to constraints in the academic world that are not known or appreciated by those outside of academia.

According to Sener (2002), the traditional role of industry advisory boards has been to advise academic programs to ascertain that the curricula are current, relevant and in line with the demands of the workplace. Along the same lines, Schuyler, Canistraro, and Scotto (2001) say that the traditional role of advisory boards is to act as a contact point for a program to keep in touch with the trends and needs of industry. Both sources

recognize that the role of advisory boards has expanded significantly beyond this original mission.

Summers (2002, 1) summarizes the mission of industrial advisory boards as follows:

“Industrial advisory boards provide a vehicle to help educational institutions execute their mission and attain their goals. This relationship provides a way to monitor the effectiveness of curriculum by providing real-world assessment of coursework as well as scrutinizing the on-the-job performance of past graduates. In addition, industrial advisory boards can contribute significantly to new program development while creating partnership with local business and industry.”

IABs are relied upon to “foster communication and encourage mutually beneficial relationships with faculty and professionals in industry and business”, “in the development of educational structures and programs capable of meeting 21st century needs”, in “promoting the educational program of the institution throughout the business and industrial community”, and to “assist in locating and securing sources of educational funding and equipment” (Summers 2002, 2).

The goals of one advisory board are spelled out in a purpose statement: “... to advise the Director on matters related to (1) new degree programs and options, (2) long-range planning, (3) marketing/community relations, (4) development, (5) other local policy matters (Summers 2002, 2).”

One case study showed that the presence of an effective industry relationship in the form of an advisory board helped improve an engineering program by increasing student enrollment, identifying needs and expectations of local manufacturing industry, supporting training programs, providing job placement, helping direct curriculum development, providing professional development to faculty members, keeping the

administration abreast of new technology, and supporting cooperative programs (Vu 1999).

A survey of advisory boards in smaller engineering schools showed the following eleven IAB activities, ranked in order of priority: spearhead capital development, identify new research for faculty, enhance program visibility, assist in recruiting students, assist in recruiting faculty, facilitate internships and job placement, examine applicability of faculty research, advise on technology/patent licensing, oversee development of new programs, define mission statement and objectives, and review curriculum for currency (Rooney 2002).

Kremens (2001) notes that an Industrial Advisory Board is an important part of the program assessment and quality assurance process, and lists three primary roles – evaluation and modification of programs through identification of strengths and weaknesses, analysis of needs and development of new courses and programs, and adjunct and student recruitment efforts.

Marshall (1999) identifies four activities of the advisory board: providing leadership in areas of program and curriculum; assisting in promoting the department's objectives within the business and industrial community; assisting in locating and securing equipment, funding and donations; and providing guidance in the transition of students to professionals.

Rooney (2002) lists the incentives that educational programs have in establishing relationships with local industry in the form of advisory boards, including access of graduates to employment opportunities and students to internships, enhancement of an institution's stature in the community, and availability of resources to help in a program's

infrastructure development. From the company perspective, involvement with an advisory board gives opportunity to influence the institution with respect to skills needed in new hires, to exercise a civic role within the community, and to forge collaborations that can benefit the company's product line or service.

Similarly, Summers (2002) gives the benefits to the institution of an industry advisory board as the opportunity to stay in touch with real world technical problems and solutions, validation of direction and value of the program, donations of equipment and funding, increased enrollment, and greater visibility and public relations. The benefits of participation to local industry include the opportunity to interact with faculty, the ability to influence curriculum and programs to better serve the needs of the community, an opportunity to network with other industry representatives, and access to faculty for short courses on topics of relevance to the organization.

Cottrell and Cecere (2004) give a case study of the involvement of an industry advisory board in the effort of a school to comprehensively revise the curriculum of an engineering program, moving from a single-tracked curriculum into one with three separate academic options. In addition to its ongoing role of advising staff and faculty on emerging trends and needs within the industry, the advisory board was closely involved in this change process, and helped make sure that the revised program met the needs of its constituents – students, faculty, alumni, employers and industry.

Several programs have board members participate in interviews with students to assess the student experience and gain a perspective on department strengths and weaknesses, with summaries presented to the faculty. A list of additional topics addressed in focused sessions by one board includes curriculum review with department faculty, a

review of departmental goals and objectives, local industry needs for instructional programs, co-op programs, graduate research programs, scholarships and fellowships, and faculty development opportunities (Elizandro & Matson 2001). Boards may be called upon to participate in department strategic planning activities.

Some programs have used the capstone design experience common to most engineering programs as a focal point for advisory board involvement (Duff & Schildgen 2005; Hurtig & Estell 2005; Kramer 2003, 2004). With this approach, advisory board members may be chosen for their ability to contribute to the capstone design experience and are active participants in the design process in local industry rather than senior corporate executives. They are asked for input on project selection and involved in the selection of design methodologies, student mentoring and project reviews. Advisory board meetings are scheduled to coincide with capstone presentations. In the context of the capstone design experience, IAB members may be called upon to present lectures to the students on professional topics in their area of expertise.

As with advisory boards in general, fundraising is an important role, though the expectation of board members in fundraising is often implied rather than explicitly stated. “An active IAB, comprised of significant corporate leaders, can serve as a valuable tool in providing support and resources (Marshall 1999, 5).” But the same source does not recommend being this straightforward with new board members. “A contribution from the members themselves is a discussion that usually occurs after several months into the process to prevent scaring potential members away.” One school does not approach its board members concerning fundraising to avoid competition in raising funds within the

university, while another did not raise money issues overtly for the first few years of the board's existence lest the members be alienated (Rooney 2002).

Hughes (2001) argues that a weakness of industry advisory board partnerships is that the focus of the relationship is the value system of the university, driven by the wants and needs of the faculty, rather than that of the students or industry. He recommends that universities and industry pay more attention to three key concerns: the cost structure of higher education, the availability of higher education to diverse populations, and faculty development, including retention, lifelong learning and career development.

2.6 Industry Advisory Boards and ABET EC2000 Accreditation

One key role of industry advisory boards has deliberately been left for discussion in a section by itself. The single most often mentioned role in recent literature for advisory boards in engineering education is to help fulfill the requirements for accreditation as spelled out in ABET's (Accreditation Board for Engineering and Technology) EC2000 accreditation process.

ABET is the recognized U.S. accreditor of college and university programs in applied science, computing, engineering, and technology. Accreditation is a non-government, peer-review process that ensures educational quality. Educational institutions or programs volunteer to periodically undergo this review in order to determine if the program meets the quality standards established by the profession for which it prepares its students. ABET currently accredits some 2,700 programs at over 550 colleges and universities nationwide (ABET 2006a). Having ABET accreditation is generally viewed as essential for the viability of an engineering education program.

To proactively involve engineering industry leaders, ABET formed the Industry Advisory Council and began to explore changes to improve the relevancy of engineering programs (Younis 2003). In January, 1994, the ABET commission met to explore whether ABET's existing criteria for engineering programs should be modified. The end result was the standard of Engineering Criteria 2000, created in cooperation with academia, industry and twenty-nine professional societies (Lalovic 2002). The new criteria were pilot tested at five institutions between 1996 and 1998, and in September 2001 became the sole standard for judging all U.S. engineering education programs.

ABET (2006a) describes the new approach:

“The revolution of EC2000 was its focus on what is learned rather than what is taught. At its core was the call for a continuous improvement process informed by the specific mission and goals of individual institutions and programs. Lacking the inflexibility of earlier accreditation criteria, EC2000 meant that ABET could enable program innovation rather than stifling it, as well as encourage new assessment processes and subsequent program improvement.”

Programs that satisfy the EC2000 criteria must demonstrate documented goals and objectives, strategic plans to accomplish these objectives, and a process that assesses the effectiveness of the plans. Demonstrating that program constituents have participated in the process is also key (Elizandro & Matson 2001).

The two most important elements of ABET EC2000 assessment are Program Educational Objectives (Criterion 2) and Program Outcomes and Assessment (Criterion 3). Criterion 2 (educational objectives), looks for the following in an engineering program (ABET 2006c):

1. Detailed published educational objectives that are consistent with the mission of the institution and these criteria.
2. A process based on the needs of the program's various constituencies in which the objectives are determined and periodically evaluated.

3. An educational program, including a curriculum that prepares students to attain program outcomes and that fosters accomplishments of graduates that are consistent with these objectives.
4. A process of ongoing evaluation of the extent to which these objectives are attained, the result of which shall be used to develop and improve the program outcomes so that graduates are better prepared to attain the objectives.

Criterion 3 (outcomes and assessment) states:

“Each program must formulate program outcomes that foster attainment of the program objectives articulated in satisfaction of Criterion 2 of these criteria. There must be processes to produce these outcomes and an assessment process, with documented results, that demonstrates that these program outcomes are being measured and indicates the degree to which the outcomes are achieved. There must be evidence that the results of this assessment process are applied to the further development of the program.” (ABET 2006c, 2)

The criterion goes on to list eleven specific outcomes that programs must demonstrate that their students attain, such as an ability to apply knowledge of mathematics, science, and engineering; an ability to design and conduct experiments; and an ability to analyze and interpret data. Programs may specify additional outcomes as part of the unique mission of the program.

There is often confusion between the terms “objective” and “outcome” as used by ABET. ABET (2006b, 20) helps clarify with the following definitions:

“Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve. Program outcomes are narrower statements that describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire in their matriculation through the program.”

Prior to EC2000, most engineering institutions lacked the assessment knowledge and experience necessary to meet the ABET requirements (Olds, Moskal, & Miller 2005). Many programs have chosen to use Industry Advisory Boards to help satisfy the

ABET criterion. An IAB may be used in help satisfy the first requirement of criterion 2 regarding program mission and objectives (Sener 2002). “The mission and objectives of the academic units should preferably be determined with inputs from such boards (Sener 1999, 1).” IABs can directly represent some of the program constituents (alumni and industry, in particular) and speak to the second objective of criterion two in determining and evaluating constituent needs. “Periodic meetings of such boards can provide a regular process by which input from an industrial constituency is determined and evaluated, supporting continuous improvement of the program (Kramer 2004, 1).” One program asks IAB members to complete an annual survey regarding the ongoing needs of their industry (Schuyler, Canistraro, & Scotto 2001). Interviews and surveys with students and graduates by IAB members can provide input into curriculum review and development. “These surveys are conducted to assess how successful academic programs have been in ensuring that students graduate with skills that ABET has deemed important (Sener 1999, 1).” As these processes are institutionalized and repeated on a regular basis, they become a key ingredient in satisfying the ABET requirement for ongoing evaluation and continuous process improvement. “The participation of (the IAB) is central to continual program objective review and improvement (Thomas & Alam 2003, 1).”

Criterion three (outcomes and assessment) lists eleven specific objectives or skills that graduates are expected to have mastered. To help the engineering program ensure appropriate focus, some programs have involved IAB members in helping rank the relative importance of these skills (Sener 1999).

The need to have a process in place to support accreditation that includes input from and evaluation by industry constituents has resulted in many programs establishing

or re-invigorating industry advisory boards (Kramer 2004). The overall result is that there are now significantly more advisory boards supporting engineering programs than would have been found prior to the year 2000.

In summarizing the purposes and objectives of industry advisory boards in engineering education as seen in the literature, the same five purposes as seen earlier in general discussion of advisory boards in education are seen here, along with two objectives that are specific to engineering educational programs; the involvement of the board in helping identify and coordinate research opportunities, and in program accreditation.

1. Curriculum input
2. Program health and development
3. Resource support (fundraising, etc)
4. Program assistance
5. Program advocacy
6. Research
7. ABET accreditation

2.7 Membership, Structure and Operation of IABs in Engineering

There is general agreement that the success or failure of an IAB rests with the selection of its members. There are differing philosophies of what the membership of an Industry Advisory Board should consist of. Here is one assessment:

“Prior to 2000, the main focus of such advisory boards was to provide prestige and resources to the program or institution. The “ideal” member would be a CEO, a corporate vice president or other highly ranked individual with a major engineering corporation. This model served many major and some minor universities well. Frequently, however, the membership was dominated by retired and semi-retired men who might not have done actual engineering work for many years and who might be from industries no longer employing many engineers locally. While such individuals do have much valuable advice to offer, they can be limited in their ability to provide input to and evaluation of the program’s development of the specific skills that are in demand by employers.” (Kramer 2004, 2)

As one program formed its advisory board in 2001, they used the following criteria for member selection:

“Its members were intended to represent the program’s local industry and alumni constituencies. This new advisory board was selected to be composed of electrical engineers who were members of local industry. Rather than trying to maximize the number of CEOs or corporate vice presidents, the “ideal” member had 5-10 years of experience and worked as a lead engineer on projects, but was not so senior as to be removed from the current hands-on technical work of his or her company. The result is a board member who is less likely to give big money in the short term and more likely to have current, hands-on knowledge that is directly beneficial to the students.” (Kramer 2004, 2)

A differing position is that members should be chosen who are on the upper end of the career ladder and have a broad view of industry, control of their schedule, and a wide range of contacts in industry and the community (Marshall 1999). This view believes that members should be chosen for their personal ability and influence, and the prestige and resources of the company they represent. They should be able to bring a high level of personal involvement and commitment and have the ability to influence and motivate others. They should be recognized in the community for their leadership, knowledge and expertise.

Rooney (2002, 2) states:

“It devolves upon the administration of the program to select individuals who have a strong civic sense, a commitment to engineering education, and an association with firms local enough and relevant enough to the program’s mission to ensure an unflagging interest in the issues affecting students at the institution.”

The experience of Johnson (2005) led to the conclusion that new board members may need to be recruited with responsibility and expertise in specific areas that are lacking on a current board, particularly as the scope or mission of an educational program changes or expands.

Also considered by some boards for membership are representatives of academia from other universities (“an active or retired academic faculty member is a highly desirable member on the Board (Cutlip 2003, 2)”) and student members, often chosen from leadership in student chapters of engineering societies (Elizandro & Matson 2001). It is generally easier for schools to recruit board members who already have significant ties to the school, which means that boards can be dominated by alumni of the school. One recommendation is to try to have approximately equal representation of alumni and graduates of other programs (Cutlip 2003).

It may be possible to group the different approaches to board membership in four categories or models – influence, wealth, relevance and relationships.

1. Influence - In the influence model, board members are chosen primarily for their status and influence in the industry and community. This model places program advocacy as a high priority, and desires to use the board as an advocate for the program with the community, industry, and university administration. The department may use the status of its board members in department advertising and strategic positioning.
2. Wealth - In the wealth model, board members are chosen primarily for their ability to contribute personal wealth and resources to the program or for access to corporate or foundation resources. This approach will often be emphasized when significant fundraising or capital improvement is a high priority for the department. In some cases, board membership might be considered a reward or recognition for past financial or resource contributions to the institution.

3. Relevance - The relevance model selects members who are able to offer the most support for students and the program from a technical, mentoring, and career perspective. Members are chosen to represent the spectrum of possible career options for students, and are generally working engineers and managers who can offer practical advice and input into curriculum and project selection or offer links and insights into corporate or other organization hiring and career opportunities for students.
4. Relationship - The last model attempts to select members who will be a good “fit” into a given advisory board environment. This may include having good personal relationships with the school or the other advisory board members or as a recognition for past contributions to the program. This approach tends to result in a high degree of homogeneity with regard to board membership, and often will turn to program alumni for consideration. In other situations, the individual may be deliberately chosen with the aim of helping increase diversity on the board, with the goal of achieving a broad cross-section of representation on the board, including age, gender, minorities, industry sector and career stage.

These models are not mutually exclusive, and the ideal board member might qualify under several of the models. (It is quite likely that an individual with wealth could also be an individual of influence, for example.) It is unlikely that any single model would be used exclusively within a program for member selection, but it is instructive to see which characteristic describes the dominant membership of the board. Selection of board members generally is the responsibility of the department chair, with input from faculty and current board members (Cutlip 2003; Marshall 1999).

The size of advisory boards varies, with literature showing membership between seven and twenty-five (Cutlip 2003; Rooney 2002; Schuyler, Canistraro, & Scotto 2001; Sener 1999; Summers 2002; Swanson & Phillips 1999). Those with boards on the larger end of the spectrum feel that the larger group provides more diversity and allows for a productive meeting even if a significant portion of the members do not attend (Schuyler, Canistraro, & Scotto 2001). Cutlip (2003) observes that too large a board can discourage active participation, while too small a board can place too much work on individual members, and recommends a board size of about ten members, with members serving as company or government agency representatives providing alternates in the event they are not able to attend.

Cutlip (2003) recommends that terms of three years for board members are most appropriate, with staggered terms so that there is one-third turnover each year and a limit of two consecutive terms. Others feel that there should not be a defined length of service or commitment (Schuyler, Canistraro, & Scotto 2001).

A common pattern for board meetings is to hold a one day meeting in the spring and fall semesters of each academic year (Elizandro & Matson 2001; Kramer 2004; Schuyler, Canistraro, & Scotto 2001), although some programs meet only once a year and have longer meetings (1.5 days) (Cutlip 2003; Flores 2002) while others meet at least quarterly (Rooney 2002). Best practice recommendations include that meetings be scheduled well in advance, that a major theme be established in advance for each meeting, that members be given the agenda and any pertinent materials in advance of the meeting, that agenda and minutes are published for each meeting, that there be time for informal interaction between the board and department faculty, and that campus tours and

recreational and cultural opportunities be considered in the context of board member visits (Cutlip 2003; Flores 2002; Marshall 1999).

Cutlip (2003) insists that the department chair coordinate board membership, meetings, correspondence, and other activities. The board expects direct input and interaction with the department chair and this duty should not be delegated to others. This is a significant and time consuming, but essential, activity for the chair which must be carried out with careful attention to detail. Board members should select an experienced member as board chair who should work with the departmental chair in setting the agenda and overseeing the board meeting and will function as the official spokesperson for the board to the school administration.

Most advisory boards function as a single body addressing all issues of relevance, but some have chosen to implement subcommittees or standing committees to focus on specific issues. Examples of standing committees include accreditation, planning, curriculum, public relations or communication, and resource development or fundraising (Elizandro & Matson 2001; Marshall 1999; Summers 2002).

2.8 Influences on Engineering IAB Effectiveness

While there is general consensus that industry advisory boards can offer significant value to engineering education programs, there is little written indicating why some programs are more effective than others or how to measure that effectiveness. Most literature extols the virtues of having an advisory board in place, but is not forthcoming on the issues or limitations of the advisory board process.

Marshall (1999) lists five key characteristics that can be used to measure the effectiveness of a program's advisory board - involvement, insight, influence, income, and program advocacy, but does not expand on the meaning or significance of these characteristics. He observes that much of the success or failure of an IAB will rest with the quality and motivation of its members.

“The sine qua non for effective utilization of a board is, of course, communication” notes Rooney (2002, 2). For a board to function in an advisory capacity, it must have access to detailed information about the program's strengths and weaknesses and be able to interact regularly with the faculty on various projects. A healthy interaction with an advisory board necessitates its inclusion in the discussion concerning any major program initiatives.

Flores (2002) lists lessons learned in setting up an advisory board process. These include the following:

- Good working relationships between board members and the institution are essential.
- The board must have access to higher-level administration and decision makers.
- A broad perspective of board members is desirable, with significant and diverse experience.
- The institution and program must make a point to follow through on board recommendations.
- The program must engage in considerable self-analysis prior to board meetings to determine strengths and identify areas that need improvement.
- The board must remember that the goal is long-term institutional change.

The experience of one author in setting up a new advisory board was that it was difficult to recruit members and that meeting attendance was sporadic. One member resigned after the first meeting, indicating insufficient time and interest in participation. The logistics of setting up a meeting time were difficult, and participation in the IAB seemed to be a low priority for members. It was observed that obtaining commitment is

easier if the goals are clear and the board feels like they are doing something worthwhile (Summers 2002). Rooney (2002, 2) comments, “To ask of professionals a significant contribution of time to devote to issues extraneous to a member’s formal employment is unrealistic”. He suggests that if attendance at advisory board meetings is a problem, more members within easy commuting distance be added, at the expense of representatives of more high profile firms who rarely attend.

Hughes (2001) and Kremens (2001) both note that the goals of industry and the goals of an educational institution are not necessarily aligned, and that this tension must be understood and addressed in the university - industry relationship. There is valid and valuable debate about how responsive a university should be to the specific needs of the business and industrial sector.

In some settings, there can be a level of innate suspicion between engineering faculty and engineering practitioners, with a feeling that those outside of academia do not understand the unique dynamics and requirements of the educational process. There may be a sense that the academic world is a private domain based on the traditional expertise of faculty, with faculty independence a priority (Rooney 2002). Activities which allow faculty and industry personnel to mingle and develop closer working relationships can be valuable in these situations.

2.9 Organizational Effectiveness Theory and Models

The literature written specifically on the topic of advisory boards and their effectiveness generally comes from a practical, experiential perspective and there is little reference to underlying theories or models of organization or team effectiveness. There has been much research and writing on the topic of organizational effectiveness, and the goal of this section is to summarize this work and to see how it could be used to help organize the study of advisory board effectiveness, and ultimately be used to develop a model of advisory board effectiveness.

The terms “organization”, “group”, and “team” all appear in the literature to describe structures that are of interest or relevance in this study. “Organization” is the broadest term, and refers to a group of people of any size organized to accomplish a common goal, including systems of considerable complexity. The terms “group” and “team” generally refer to smaller sets of people with more singular ties, and are often used interchangeably in the literature, although “team” carries stronger connotations of people assembled to work on a common objective. Much of the literature comes primarily from the perspective of business organizations or work teams, but the underlying principles and constructs are seen to be applicable to advisory boards in the context of this study.

The modern era of research on management and organizational theory dates back to the early part of the 20th century and the publication by Taylor in 1911 of *Principles of Scientific Management* (Lewin & Minton 1986). The bestseller status of popular books such as *In Search of Excellence* (Peters and Waterman 1982) and *Good to Great* (Collins 2001) indicates the degree to which interest in organizational effectiveness has permeated the popular and business culture. The argument is made that effectiveness is a central

theme in all of organizational analysis (Goodman & Pennings 1977), lies at the center of all organizational models (Cameron & Whetten 1983a), and is the desired end in the applied fields of organizational development and organization design (Quinn & Rohrbaugh 1983). Cameron (1986, 540) states that, “Empirically, effectiveness is generally the ultimate dependent variable in research on organizations”.

While effectiveness is clearly a central concept in organizational analysis, the literature shows a notable lack of consensus on the definition, measurement, and modeling of organizational effectiveness. Quinn and Rohrbaugh (1983, 363) note that, “Effectiveness literature is in disarray”, while Sowa, Selden, and Sandfort (2004, 712) state that, “Organizational effectiveness research is beset with controversy, including debates about the primary factors that constitute organizational effectiveness”. One of the major problems is the elusiveness of a definition of effectiveness. “No one ultimate criteria of effectiveness exists”, says Cameron (1978, 604). “Universalistic propositions linking a set of variables to effectiveness can never be known because the meaning of the dependent variable continually changes” (Cameron & Whetten 1983a, 3). The primary reason for this, a number of scholars argue, is that effectiveness is not a concept but a construct - a high level abstraction composed of concepts at lower levels of abstraction (Cameron 1986; Campbell 1977; Quinn & Rohrbaugh 1983). This means that any study of organizational effectiveness must focus on the components that make up effectiveness, which may be different depending on the organizational structure, goals, and culture (Kanter & Summers 1987). Campbell (1977) says:

“To ask a global question about whether an organization is effective or ineffective is virtually useless. Effectiveness is not one thing. An organization can be

effective or ineffective on a number of different facets that may be relatively independent of one another.”

Lewin and Minton (1986, 532) expands: “While the development of a universal theory has eluded most researchers and discouraged others, the components of a contingent behavioral theory of organizational effectiveness exist.”

The earliest models of organizational efficiency were single-dimensional and goal-based (Rojas 2000). These models assume that an organization can clearly define its objectives and that effectiveness can be measured by how well the organization accomplishes its stated goals. The organization is assumed to be in the hands of a rational set of decision makers who have in mind a well-defined and understood set of goals they wish to pursue (Campbell 1977). This approach is termed the goal-centered or Rational Goal model. While there is valuable simplicity and focus in this model (as emphasized in the Management By Objectives process first popularized by Peter Drucker in his 1954 book *The Practice of Management*), there are significant limitations to this model, among them that the selection of inadequate goals cannot lead to an effective organization. There are also significant human and external factors that this model does not take into account.

To deal with these limitations, organizational theory then recognized a second model of organizational effectiveness, sometimes termed the Natural Systems view. In this approach, attention is focused not only on the output of the system, but on the processes and activities required for the organization to maintain itself (Quinn & Rohrbaugh 1983). The emphasis is generally on people factors, such as morale and cohesion, and the internal processes that the group uses to accomplish its objectives

A third view of effectiveness has been referred to as the Open Systems model (Scott 1977). This model recognizes that an organization does not exist in a vacuum and views organizations as highly interdependent with their environments. In this view, outside customers define effectiveness more so than internal constituents, and external factors control many of the system resources. A group's bargaining position is a critical consideration, and flexibility of operation is sought.

Most of the literature on organizational effectiveness modeling can be grouped into one or more of these three views (Rational Goal, Natural Systems and Open Systems), with a recognition that each one addresses only part of the overall construct of effectiveness. Quinn and Rohrbaugh propose a four dimensional approach to effectiveness modeling (Quinn & Rohrbaugh 1983). Starting with a list of thirty effectiveness indices extracted by Campbell (1977) in a summary of the effectiveness literature, they found that these indices could be grouped by common elements in locations along two different axes based on cognitive structure - the way researchers might think about the organizational effectiveness construct. The first axis was control versus flexibility, or high control versus low control. Indices were grouped by whether they had high elements of stability and control versus elements of flexibility and uncertainty. The second axis was internal versus external emphasis. Indices were positioned according to a focus on operations and forces within the organization versus a focus on external customers and external factors. This resulted in four quadrants or dimensions of effectiveness, with opposite quadrants in some degree of tension. The quadrants can each be considered views, or models, of organizational effectiveness, as shown in Figure 2.1.

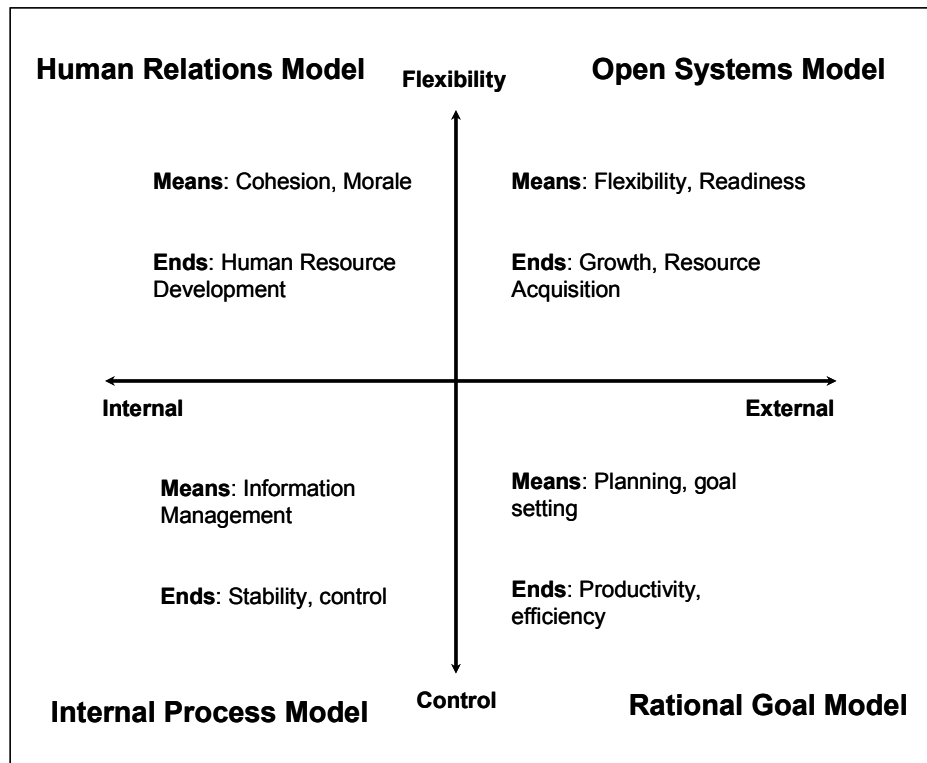


Figure 2.1. Quinn and Rohrbaugh (1983) model of organizational effectiveness.

The first model, which they term the Human Relations Model, is found in the quadrant of internal focus and low control (or high flexibility). The values emphasized in this model are group cohesion, morale, and personal satisfaction and the focus is on how individuals within the group interact with each other.

The second model is found in the internal focus, high control quadrant and is termed the Internal Process Model. The emphasis of this model is on organizational structure, processes, and control within the organization. Valued are organizational clarity, efficiency, and communication

The third model is referred to as the Open Systems Model, and is found in the quadrant which represents external focus and low control (high flexibility). The focus here is on satisfying the external customers or constituents of the organization, with the

ability to respond to changing environments and obtain needed resources being key considerations.

The final model is the Rational Goal Model, where focus is again external but control is high. Here the emphasis is on the group setting objectives and managing outcomes that are within the control of the group. Planning, goal setting, productivity, and efficiency are valued.

Although the Quinn and Rorhbaugh model was derived using the cognitive structure of organizational theory rather than the usual factor analytic approach, the end result is closely aligned with the three models often referenced in the literature (Rational Goal, Natural Systems and Open Systems). Their model parts from others in the literature in that it divides the Natural Systems model (internal operation of the organization) into two components – the Human Relations view, focused on human interaction, and the Internal Process view, focused on internal organizational processes.

Quinn and Rorhbaugh then add a third axis of differentiation based on a consideration of whether the factor under consideration is primarily associated with the ends or objectives of the organization, or the means by which the organization accomplishes its purposes. This results in a consideration of the means versus the ends within each model quadrant. This is an important consideration, as there tends to be confusion or blurring within the modeling literature on which are the independent or input variables (means) versus the dependent or output variables (ends) within a particular model (Campbell 1977).

In agreement with Quinn and Rohrbaugh, Cameron (1986, 545) emphasizes that organizational effectiveness has many elements with competing values, and that, “To be

effective, an organization must possess attributes that are simultaneously contradictory, even mutually exclusive.” The modeling approach of Quinn and Rohrbaugh recognizes that this tension exists between values in each of the models, and the overall effectiveness of an organization may very well depend on how well the organization is able to reconcile these competing demands or pressures. Cameron gives several illustrations of the paradoxes in effectiveness, including high specialization of roles (which reinforces expertise and efficiency – Rational Goal model values) versus high generalization of roles (which emphasizes flexibility and interdependency – Open Systems and Human Relations model values). Any comprehensive approach to effectiveness modeling must take into account this aspect of competing values or paradox.

The Quinn and Rohrbaugh four dimensional model appears to be the most comprehensive and well-defined of the general approaches seen in this review of organizational effectiveness theory and modeling, and lends itself well to being applied to this study of effectiveness in engineering education advisory boards. The next section deals with how this model might be mapped, adapted, and narrowed for application into such a focused study.

CHAPTER 3: A PROPOSED MODEL OF INDUSTRY ADVISORY BOARD EFFECTIVENESS

3.0 Summary

While there is strong opinion in the literature that there cannot be one universal model for organizational effectiveness (Cameron & Whetten 1983b), a model more narrowly focused on the effectiveness of advisory boards in engineering education can be developed that can have significant value in helping frame the study of this topic. This section proposes a general model of engineering education industry advisory board effectiveness based on the Quinn and Rohrbaugh (1983) model of organizational effectiveness, which has four identified model elements (Human Relations, Internal Process, Open Systems and Rational Goal). For each model element, the values of the model are identified, the primary output (ends or objectives) of the model listed, along with the primary input factors (means) that influence the model, and the board member selection criteria that the model might emphasize. The goal is to map the objectives (outputs), inputs (influence factors), and member selection recommendations seen in the literature on advisory boards into this general model, along with any additional elements suggested by the model structure itself. The proposed model is shown in Figure 3.1. The major elements of the model are described below.

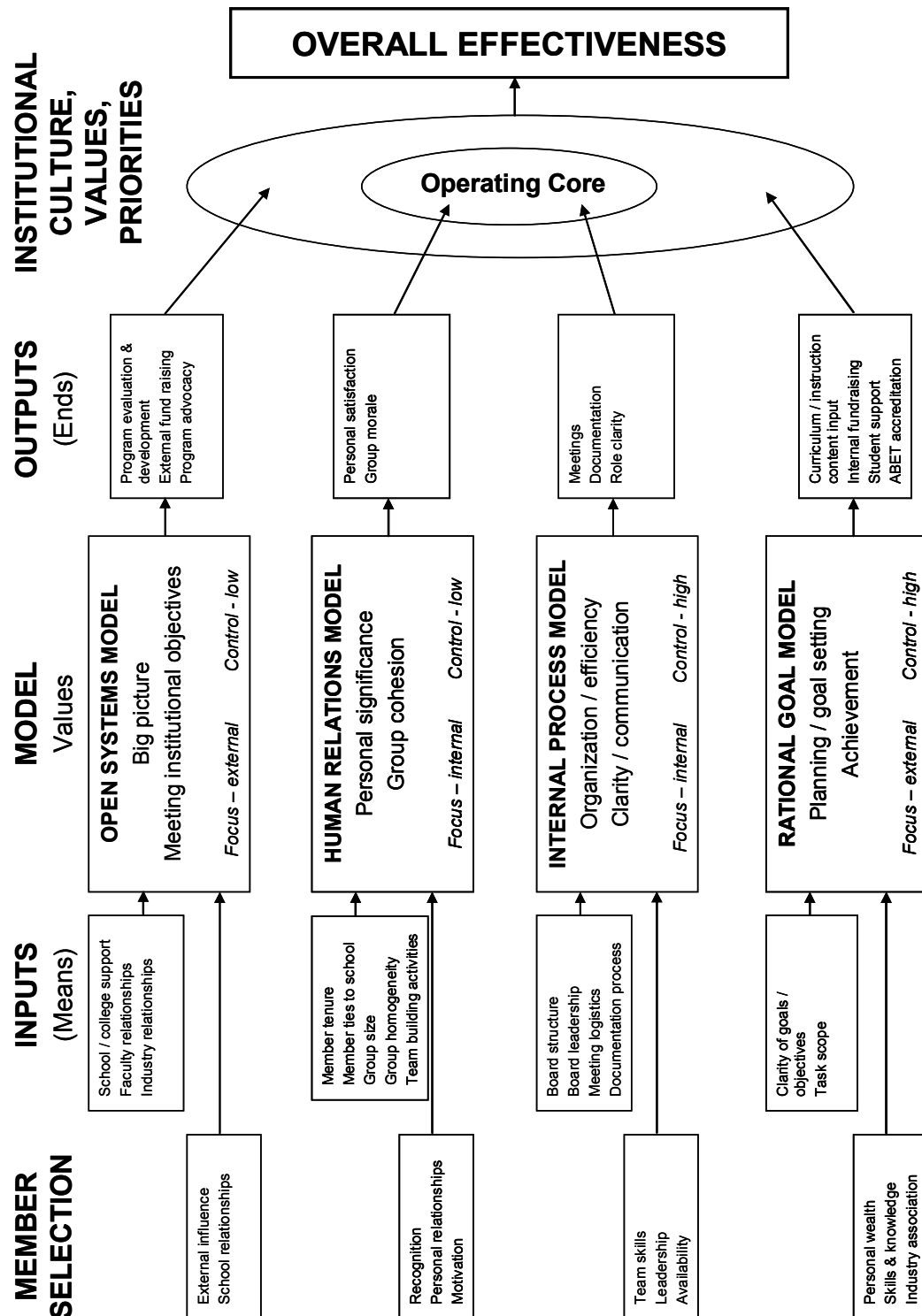


Figure 3.1. Proposed general model of advisory board effectiveness.

3.1 Human Relations Model

The first model element considered is the Human Relations model. In this view, interpersonal relationships within the board play a key role in influencing the effectiveness of the board. With respect to the four quadrants of the Quinn and Rohrbaugh model, this element is focused on the internal operation of the board, and the ability to control and predict the model dynamics is low, thus requiring a high degree of flexibility in board operation in this area. This model values group morale and cohesion and desires that individual members feel personal satisfaction and significance because of their involvement on the board.

The output or ends of the Human Relations model are somewhat intangible and are tied to the values of the model. A board that is effective in this area will have group members that enjoy participation on the board, get along well with other members of the board, and feel that their individual contributions are valued. This can be characterized most effectively through surveys and interviews, although member turnover and the degree of member attendance and participation in meetings can give some indication of how well a board is doing in this area.

Board member selection in this view of board effectiveness will generally follow the Relationship Model noted earlier. Consideration of how well the board candidate will “fit” with the other members is a key concern. Long term relations with the school, often as alumni, will be valued. Board membership may be looked upon as a recognition or honor for contributions (financial or otherwise) to the school.

Factors that influence the effectiveness of a board in this model (inputs or means) include the length of tenure and stability of board membership, the degree to which

members have ties to the school, the size of the group, and the cultural homogeneity and diversity of the board members. If there are issues or concerns with interpersonal relationships on the board, or to maintain group cohesion, board leadership may conduct specific team building activities within the group.

3.2 Internal Process Model

In the Internal Process view of organizational effectiveness, attention is on the processes and systems within the board that keep the board operating on an ongoing basis. On the Quinn and Rohrbaugh axes of differentiation, this model has internal focus but the level of control of factors that influence the model is high. This model values organization and efficiency along with clarity of roles and effective communication within the group.

In this model, the outputs of interest are seen as the direct result of organizational processes in operation. Meetings are conducted with regularity and efficiency, with agendas set ahead of time and minutes documenting the activities and actions of the group. Charters or other appropriate documents clearly spell out the objectives, roles, and responsibilities of the board. Leadership of the group is effective and roles for members are well defined. Effectiveness in this area can be characterized by the examination of appropriate documents, including minutes, agendas, and charters, and also by surveys and interviews of those involved.

In this model, a potential board member's time and availability is a significant consideration. Board members who are inactive, either due to lack of interest or lack of time, will be replaced with members who can contribute more regularly. Some

consideration may be given to leadership skills and organizational abilities of new members, particularly if the board has had weakness in these areas in the past.

As seen earlier, a fair amount has been written in the literature on factors that influence advisory board organization and efficiency. Considerations include meeting logistics (where and how often meetings are held, how long they last, etc), board structure (member roles, subcommittees, etc), leadership (how leaders are chosen, leadership effectiveness), and documentation processes.

It is worth noting that, up to this point, none of the six general purposes or objectives of advisory boards summarized earlier in the literature have been mapped as outputs of this effectiveness model. This is largely because the emphases of the Human Relations and Internal Process models are internal – more concerned with how the board is operating internally than with deliverables to external constituents. In some ways, the Human Relations and Internal Process models are foundations for the next two models, which are more externally focused. Unless the group is healthy and operating effectively internally, it will not be able to be effective in accomplishing its externally visible objectives.

The seven primary objectives of engineering advisory boards summarized earlier from the literature will map into either the Open Systems or Rational Goal models of board effectiveness. To determine which model each objective satisfies, the axis of control is examined. If the objective can be accomplished with only the internal resources of the board and there is little interaction with external systems, then the degree of control over the objective is high and the objective will be considered part of the Rational Goal model. If the objective requires considerable interaction with external

constituencies or systems to accomplish, then the degree of control by the advisory board is considered low, and the objective is mapped into the Open Systems model.

3.3 Rational Goal Model

The Rational Goal model is concerned with objectives that the board can set and accomplish primarily with internal board resources and effort. The focus is on external deliverables and the level of control by the board is high. This model values the process of setting clear goals and objectives and measuring progress and achievement.

Parts or all of four of the objectives listed earlier for advisory boards map primarily into this model. The objective of curriculum and instructional content review is considered in this context. Here, the experience and knowledge of the individual members are called upon to help determine whether or not the program is preparing students adequately for industry needs. Program assistance falls under this model, where board members may contribute their personal time and expertise in lecturing, mentoring, advising, and helping structure and assess student design projects. The last objective considered as part of this model is in program accreditation, where individual members or the board as a whole may be called upon to help assess ABET accreditation criteria, as discussed earlier in section 2.6 on accreditation processes.

For the purposes of this discussion, fundraising is divided into two types - internal and external. Internal fundraising is defined as funds or resources obtained directly from board members, while external fundraising uses the influence and connections of the board members to raise funds from other sources. Internal fundraising is an objective

considered in the Rational Goal model - the ability of board members to contribute to program fundraising from personal resources.

Assessing performance in the Rational Goal model lends itself to a more structured and quantifiable approach, as might be expected from the title of the model. Program documentation can be reviewed to determine what goals or plans are set in the areas of fundraising, curriculum input, student support, and program accreditation, and to assess to what degree these objectives have been accomplished. Surveys and interviews with board and program leadership (such as school directors) can also provide assessment in this area.

Those selecting members with the Rational Goal view are likely to consider one or both of two possible member selection models - the Wealth or the Relevance model. In the Wealth model, internal fundraising is a priority and members are chosen with consideration of their personal ability to contribute resources to the program. In the Relevance model, members are chosen for their knowledge, skill, and experience in industry or education so that they can contribute effectively to instructional content review, student support, or program accreditation.

3.3 Open Systems Model

The Open Systems Model places emphasis on the fact that an advisory board exists within the larger context of the school and institution it serves, the community within which the school is located, and the industry or other constituents which hire graduates and benefit from the research of the program. This model is externally focused, with recognition that the ability to control the surrounding environment and

expectations is low. This model values a big picture view of the board's role, with the goal of satisfying to the greatest possible extent the expectations of the constituents of the board, including the program students and faculty, the larger interests of the institution, and the community and relevant industry. As these interests are not always clearly defined and may be in some ways competing, flexibility in board objectives and operation is essential.

The objective of program health and development falls in the Open Systems model, as this requires considerable support from and interaction with faculty and other institutional resources. External fundraising is one of the objectives of the Open Systems Model – using the influence of board members to help procure external funds and resources for the program. Also in this category is research support (using board member influence and connections to help direct and fund institutional research). Program advocacy is an important objective in the Open Systems model, where board members are asked to use their voice and influence to advance the interests of the program with school administration, legislatures, industry, and potential students, and generally help promote positive visibility for the program.

Board effectiveness in the Open Systems dimension is primarily measured by “customer satisfaction” – how well the board is viewed as meeting the expectations of its constituency. This can be measured through surveys and interviews with the constituents. Review of board and program documents can help give an assessment of board effectiveness in this area, particularly in the areas of fundraising, research, and program evaluation. Program advocacy is harder to measure, but looking for evidence of

board participation in public relations material from the program and the institution can be instructive.

From the Open Systems perspective, members will generally be chosen using the Influence model described earlier. In this model, members bring to the table connections and influence with external constituents such as institutional administration, community, media, and industry leaders, and access to external resources and funds.

Factors that influence effectiveness in the Open Systems model revolve around the interaction of the board with the larger system in which it operates. This includes the support of faculty and administration, and interaction with and support of community, government, and industry.

3.5 Overall Effectiveness

Each individual model element is based on organizational effectiveness theory and research, and it should be possible to determine measures of effectiveness in each space and to characterize the sensitivity in each model to member selection criteria and other input factors. One of the goals of this research is to accomplish precisely this, and to validate the model elements as being universally applicable across various programs.

When it comes to the overall assessment of advisory board effectiveness, a number of additional issues come into play. This first is the recognition that there is no universally accepted definition of overall organization effectiveness, and that effectiveness is a construct, not a single concept (Cameron & Whetten 1983a). The second is the reality that different institutions will place different emphasis or value on

each of the model elements, depending on the culture, values, and priorities of each institution and each constituency within the advisory board context.

Overall effectiveness is approached as a subjective measure based upon interviews and surveys with board constituents. The relationship between effectiveness in each individual model area, which is more easily and rigorously determined, and overall effectiveness as a subjectively measured output, is explored in the research to determine to what degree there are trends or consistencies of linkage between the individual model element effectiveness and an overall effectiveness assessment. It is anticipated that this linkage will vary considerably depending on the institution and the constituency that is responding. A research hypothesis that is explored, however, is that programs that are judged as highly effective overall will have elements in each of the four model areas that are viewed as highly effective. In other words, for a program to be effective overall it must be effective in each of the four model areas.

3.6 The Effectiveness Model and the Research Questions

It is worthwhile to note that the four research questions map reasonably clearly into different sections of the model. Exploring the research questions will contribute toward validation of the effectiveness model. Figure 3.2 illustrates this mapping.

The first research question (*How is overall effectiveness defined and assessed?*) addresses the final construct of overall effectiveness and its linkage back to the individual outputs of each model type. It is focused on the Overall Effectiveness and Institutional Culture, Values and Priorities section of the model. The question asks how programs assess overall effectiveness and attempts to uncover the relationship between overall

effectiveness, which is ill-defined and varies from program to program, and the better defined and measurable effectiveness elements at the next level of the model.

The second research question (*What are the elements that make up effectiveness and how are they measured?*) is focused on the outputs of each of the four effectiveness perspectives which constitute the Output (Ends) section of the model. This question attempts to identify, define, and measure the individual elements of effectiveness which typically show up as objectives of an advisory board.

Research question three (*What are the factors that influence effectiveness?*) looks at the input or independent variables of each of the effectiveness perspectives, the Inputs (Means) section of the model. The goal is to identify those factors that affect and control the effectiveness output elements and to establish the nature and extent of those relationships.

Research question four (*How does member selection influence effectiveness?*) is a more focused version of question three, looking specifically at the effects of different member selection models on board effectiveness. It encompasses the Member Selection section of the model. The goal is to identify the nature and extent of the causal relationship between board composition and board effectiveness.

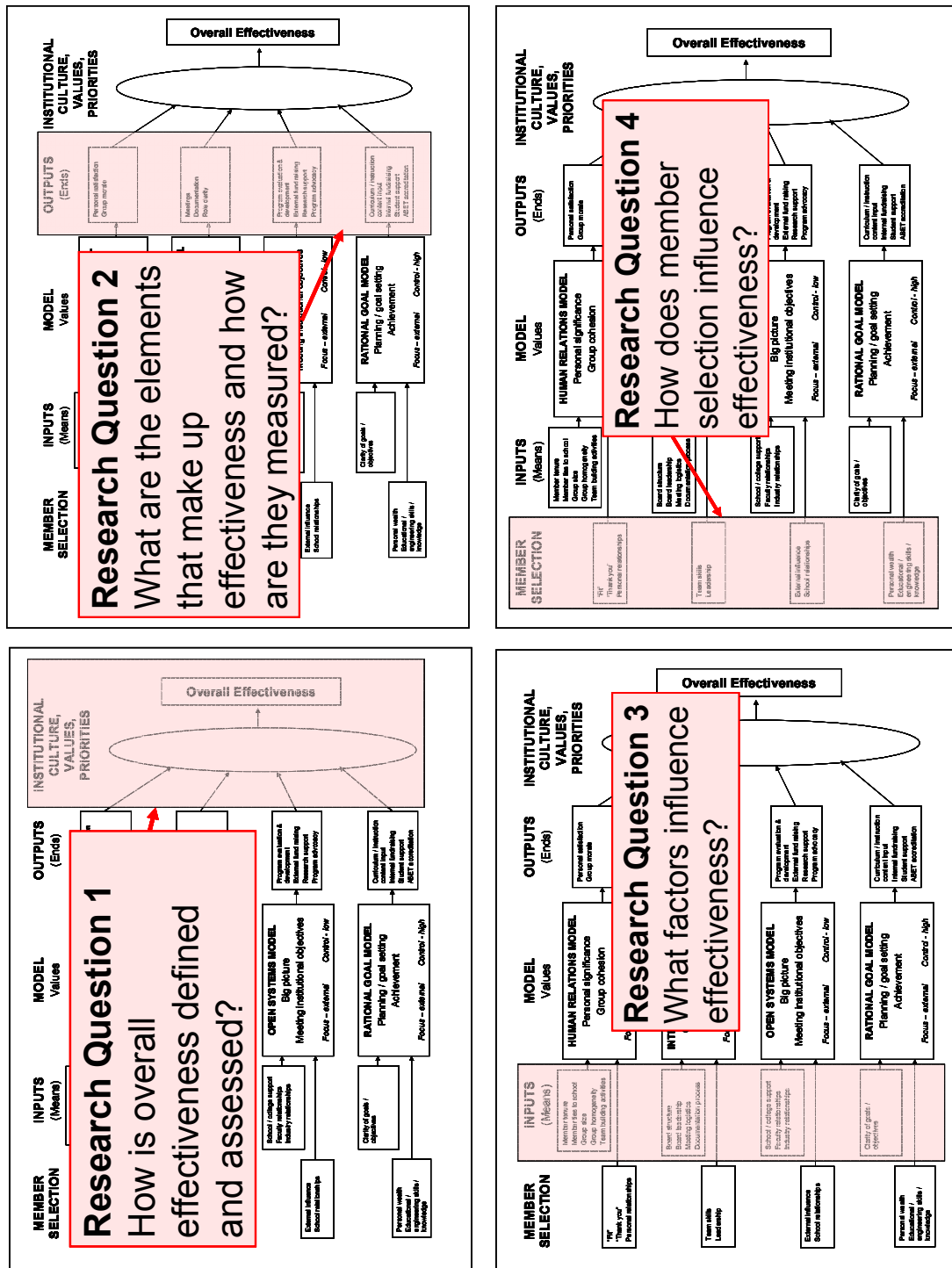


Figure 3.2. Mapping of effectiveness model and research questions.

CHAPTER 4: RESEARCH METHODOLOGY

4.0 Summary

This research followed a mixed-methods approach, as neither a completely quantitative nor a completely qualitative research methodology could adequately address the entire scope and depth of the research questions. The research proceeded in two main phases: a series of interviews leading to a qualitative case study and a widely distributed survey, with associated quantitative analysis. The goals, methodology, and participants for each phase are described.

4.1 Research Phase One - Qualitative Review and Case Study

The first phase of data collection in this research was a qualitative review of the advisory board programs of two engineering schools at the University of Oklahoma. These are identified as School A and School B. The goal of this phase of the study was to gain a first-hand look at the operation of advisory boards, to see how the advisory board model applied in practice, and to inform the next stage of the study, the large scale survey. The willing support of the department directors was received, as well as support from the advisory board chairs, to allow the researcher access to these programs. The qualitative methodology was that of a case study and included observation of board meetings, interviews, and review of documents.

Starting in the spring of 2006, the researcher was able to participate as an observer in advisory board meetings of these two programs. The researcher gave a brief summary of the objectives and methodology of the research to the board in these

meetings and requested their ongoing support. In addition, the researcher was able to observe board meetings of one program in the fall of 2006 and the spring of 2007, and in the spring of 2007 with the other. Notes were made on the content of the board meetings, their organization and structure, and the tone and interpersonal dynamics of the meetings.

Both programs gave permission for the researcher to interview school leadership and board membership as part of this process. After receiving approval from the University of Oklahoma Institutional Review Board (IRB), the researcher began a series of interviews in person and by telephone. Before each interview, participants were asked to sign an IRB informed consent form (Appendix A) and were promised confidentiality and anonymity in their responses. The interviews lasted from twenty-four to seventy-seven minutes, with an average length of forty-nine minutes. The interview process was semi-structured, with a series of questions developed ahead of time that were appropriate to the participant (board member or department director). With the participant's permission, the interviews were recorded and later transcribed. An identification coding system was developed which allowed recording and tracking of the interviews by ID code rather than by name. The interviews were then coded using Nvivo 7 software to organize and extract key content from each interview.

There were fourteen interviews conducted in total. Table 4.1 lists the interview participants.

Table 4.1. Case study interviews.

Role	School	Number of Participants
School Director	A	1
Former Director	A	1
Board Chair	A	1
Former Board Chair	A	1
Board Member	A	4
School Director	B	1
Former Director	B	1
Board Member	B	3
Dean of College of Engineering		1

Documents outlining the charter or bylaws of six different engineering school advisory boards at the University of Oklahoma were obtained, including the charters of schools A and B. These documents outline the purpose, membership, and operation of these advisory boards. In addition, school A made available a wealth of historical documents describing the operation of its advisory board, including agendas, minutes, and ABET assessment information.

4.2 Research Phase Two - Survey

Following the interviews, observation, and document review, a comprehensive survey of advisory board operation was developed. The content of this survey was derived based on the advisory board literature, on the effectiveness model structure, and on the insights gained in the qualitative phase of the study. The survey was specifically designed to ensure that each of the research questions was thoroughly covered and each aspect of the effectiveness model was explored.

An on-line survey format was chosen, primarily because of ease of construction, ease of distribution and low cost (Cook, Heath, & Thompson 2000; Sheehan 2001). The survey was developed in a web-based application called Select Survey ASP, supported by the IT department at the University of Oklahoma. It was set up to allow anonymous access without an identification code or password, but allowed only a single response from any given user. Participants were sent an e-mail which provided a link to the web address of the survey application.

The survey has a total of 116 questions, divided into eight major sections (Table 4.2), but not every participant was asked all of the questions. A common set of questions was asked of every participant, but the role of the participant (department director or board member) determined which of the remaining questions would be asked. The first page of the survey described the purpose of the study, the procedure for completing the survey, explained the voluntary and confidential nature of the study, and provided contact information in the event of questions. At the end of the page was a question regarding the informed consent of the participant. If they did not answer the informed consent question positively, they were not allowed to continue with the survey. Table 4.2 summarizes the content of the survey, and the entire survey can be found in Appendix C.

There were three types of questions used in this survey. The most often used format, used to solicit opinion input on effectiveness, importance, and operation topics, was a 1 to 5 interval scale, with a “don’t know” or “not applicable” option where appropriate. This type of question was anchored at each end. For instance, a 1 was designated on some questions as “Strongly disagree” and a 5 as “Strongly agree”, with no

Table 4.2. Survey content overview.

Page	Content	Number of Questions	Respondents
1	Introduction and informed consent	1	All
2	Respondent role and institution	3	All
3	Questions regarding advisory board objectives	17	All
4	Questions regarding advisory board effectiveness	7	All
5	Questions regarding board operation and member selection	44	All
6	Questions regarding board operation and structure	17	Directors
7	Questions regarding board operation	11	Board Members
8	Questions regarding board member demographics	15	Board Members
9	Final Comments	2	All

designation of the meaning of the intervening numbers. Figure 4.1 is an illustration of a typical survey question of this type. The goal was to have respondents think of the response in terms of approximately equal intervals. This format was deliberately chosen rather than a typical scale with identified categories for each response in order that the data could be treated as interval rather than as ordinal data, which allows for more powerful analysis. The second type of question used a multiple choice, check box format. This was used when data was requested on board operation or board member demographics. The third type of question was an open field format, used primarily to allow respondents to add comments. The only questions that required an answer were the informed consent question at the start of the survey, and that of the respondent's role, as this determined which set of questions would be presented in subsequent sections of the survey.

9.1 Indicate the degree to which you agree or disagree with the following statements regarding the operation of your advisory board

	1 Strongly disagree	2	3	4	5 Strongly agree	No opinion
I attend all of the advisory board meetings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure 4.1. Typical survey format for opinion questions.

Following completion of the survey, respondents were directed to a separate application which allowed them to provide an e-mail address if they wished to have a summary copy of the study when completed. Access to this summary was an incentive provided for participation in the survey. Over 90% of the respondents to the survey took advantage of the opportunity to request this summary.

The survey was designed as much as possible to take into account factors that would maximize the response rate of the survey (Deutskens, De Ruyter, Wetzels, & Oosterveld 2004). The recruitment e-mail was individually addressed by name to directors. The survey was kept to a reasonable length (ten to fifteen minutes to complete), was sent to individuals for whom the topic of advisory boards was salient, and had an incentive for completion (access to a summary of the completed study). A follow up e-mail was sent out three weeks after the original request.

The survey was piloted by sending it to the engineering faculty and advisory board members of a small engineering school in another state with which the researcher has an ongoing relationship, and asking for feedback on the survey mechanics and questions. These survey responses were not included in the final survey results. The final survey was reviewed and approved by the University of Oklahoma Institutional Review Board (Appendix B).

The survey was distributed to 208 engineering school directors from thirty-eight different engineering institutions. These universities were all classified as research institutions according to the Carnegie classification (Reis 1997). A deliberate effort was made to choose engineering colleges from every geographical region of the United States. Engineering disciplines chosen for this study were Chemical Engineering, Civil Engineering, Computer Science, Electrical / Computer Engineering, Industrial Engineering, and Mechanical Engineering. It was felt that these were all well established and widely supported programs and tended to have similar relationships with industry. A small number of directors were identified through personal contacts by the researcher and his advisor. The remainder were identified by searching through educational institution websites which listed engineering school directors and contact information. A personalized e-mail was sent to directors, addressing them by name and asking them to consider completing the survey and forwarding it on to members of their advisory boards. The recruitment e-mail can be found in Appendix D.

CHAPTER 5: THE EFFECTIVE ADVISORY BOARD – A CASE STUDY

5.0 Summary

A series of interviews were conducted with school leadership and board members from two different advisory board programs at the University of Oklahoma, along with observation in board meetings and review of board documentation. One board was consistently identified by all involved as very effective, though the history of the board indicated that this had not always been the case. It was felt that this board would make an instructive case study, and conclusions are drawn regarding the current state of effectiveness of the board and the changes that occurred to bring it to this state.

5.1 Case Study Rationale

Access was gained to two school-level advisory boards in the College of Engineering at the University of Oklahoma. Several board meetings were observed over a period of a year and a half. Board charters, agendas, and minutes were reviewed, and interviews were conducted with fourteen individuals, including board members, current and former board chairs, current and former department directors, and the dean of the College of Engineering. The effectiveness model was used as an outline to structure the interviews and as a guide to categorizing the findings, and proved valuable and consistent from both perspectives.

In the observation and interview process, it became clear that one of the advisory boards being studied was viewed by all involved as particularly effective. In the

interviews, all queried members of this board were enthusiastic about their participation, felt that the school valued their input, and that they were able to add significant value through the process. Those involved in the school administration were equally positive in their assessment of the board's contribution to the program. When asked to give a numerical rating for overall effectiveness of the board on a scale of one to ten, ratings were consistently in the eight or nine range. The latest ABET accreditation report cited the input and involvement of the advisory board as one of the program's strengths. Those involved in the process who had exposure to other advisory boards, both within the college and at other institutions, gave this board high marks in comparison.

Of particular interest was the observation by many who had been involved in the program over an extended period of time that this had not always been the case for this board. In the period of time before the late 1990s, board operation was described as perfunctory, with effectiveness ratings in the range of two to four. For a period of a couple of years in that time, the board did not meet at all. This, of course, brought to the forefront the question of what changed in the board and its operation to result in such a significant turnaround in effectiveness. After studying this board, both in terms of current operation and from a historical perspective, it was felt that this board could serve as an excellent case study in the operation and composition of an effective industry advisory board.

5.2 Historical Perspective

The advisory board for this engineering program has been in existence for longer than anyone currently involved can remember, certainly over twenty years. Operation of

the board in the late 1980s and early to mid 1990s was described by one board member as “perfunctory”, and there was a period of a couple of years when the director of the school did not call board meetings at all. One member theorized, “I don’t think that person wanted the advisory board involved because they might find out something, might say something about his performance, you know.” Several individuals involved in the board at that time recalled that meetings consisted mostly of status reports from the school, and one said “you know, some people in that position want to tell you what they’ve done and use it as a ‘how great I am’ sounding speech ... if you go just listen to a report of how great we are, to my mind, I’m not interested in participating in it.” The program had experienced a high level of turnover in department leadership, and was struggling with low enrollment. Board membership was small (seven or eight members), with significant longevity of service, and there was essentially no diversity on the board, though the school was becoming increasingly diverse. Although board members had close ties to the school and were eager to be supportive, they were frustrated that they would give input at board meetings, and come back at subsequent meetings to see no action or follow up. “You talked, but didn’t ever see anything happen.”

5.3 The Board in Transition

In the late 1990s, a significant turnaround occurred in the operation and effectiveness of the board that was tied most closely to the arrival of a new school director. This individual had a combination of industry and academic experience, and had seen the value of advisory boards in the past, both as a board member and from the academic perspective. “I came to this with a conviction that these advisory boards are

important.” Faced with the challenge of revitalizing the program, he believed the advisory board was a resource that could be tapped to assist in the process. The new director teamed up with the chairman of the advisory board at that time, who had the trust and confidence of the board, and set about to deliberately make some changes that would improve the effectiveness of the board.

The first task was to introduce some new blood into the board membership, individuals with a proven track record in industry and who the director knew could be counted on to bring fresh energy and perspective, and in the process reenergize the existing membership. As the board chair at the time commented, “We’ve got too many of us old guys on here.” As time went on, members were added with deliberate attention towards diversity - diversity of industry and career experience, diversity of gender and culture, and members who were not alumni of the university.

The board chair was a strong leader with broad experience in strategic planning, and he and the director began to make meetings well planned and purposeful, with a business-like feel and organization. One of the key messages conveyed to the board was that their input was sought and valued, and this was reinforced with a deliberate effort to make sure that input was acted upon and follow-up status was given at subsequent board meetings. The department director tasked the board with concrete actions, specifically chosen to be of significant value to the department while at the same time being within the scope of what volunteers could reasonably be expected to do. One of the tasks was to raise funds for an advisory board department scholarship, and the board responded willingly.

5.4 Current Perspectives on Effectiveness

Though the department director at the time of the transition is no longer in that role, subsequent directors have maintained and built upon the pattern of board operation that was established at that time. The college dean commented “I think most people say that it is the most vigorous and effective of all of our boards in the college”. Both school leadership and board membership see significant value added by the advisory board, and are enthusiastic about their participation. In interviews, board members consistently commented on how the school asked for their input, took their recommendations seriously, and followed through on what they heard from the board. Members provided examples of where the board was able to influence curriculum and program content, including increased preparation for students in the use of application software, increased emphasis on communication and presentation skills, computer aided design instruction, and the introduction of a joint engineering and business MBA program. A high percentage of board members attend each meeting, and in the words of one board member “It’s pretty easy to attend the meetings when you feel like you’re actually getting something done versus just going through the motions. I think that counts for why we’ve got pretty good attendance and pretty involved board members.” There is a feeling of growing trust and mutual respect between the school and the board, and a sense in which issues of a more strategic nature are increasingly being discussed with the board.

5.5 Advisory Board Priorities

There was general agreement from those interviewed that the top two objectives of the board are providing industry perspective and input to the academic program, and

helping the school by raising funds. Board members generally emphasized the importance of providing a link to industry. One member commented specifically, “The main objective of the advisor board is to keep the school relevant to the needs of industry” and other board members made similar observations. School leadership, on the other hand, while recognizing the importance of this input, tended to be more appreciative of the ability of the board to provide discretionary funds to the school. “They provide us flexible sources of money that we do not get from the state allocations.” Board members had a general understanding that the board played a role in the ABET accreditation process, particularly through interviewing current students and recent graduates to get their assessment of the program, but school leadership had more appreciation of the significance of this role: “I don’t really see how you could comply with ABET 2000 without these boards.” While there was evidence of the board’s involvement in other ways (student support, program advocacy, and program evaluation and development), these did not seem to be as high a priority as the other objectives.

5.6 Fundraising

A deliberate decision was made a few years ago by the board and school leadership to be very clear about expectations from board members in fundraising. The board charter was amended to read “Members are expected to provide an annual donation to the school”. No amount is specified, but there is regular discussion at board meetings about the state of current fundraising activities and the extent of member participation. Major fundraising emphasis over the last several years has been directed towards providing student scholarships and facility renovation. In addition, the board has been

supportive of college level capital fundraising campaigns. There did not seem to be any level of discomfort expressed by board members at this emphasis and expectation. There is recognition by school leadership that board members are much more responsive to appeals to fund specific projects within the school rather than general appeals for financial support. “My sense is that board members don’t like to give money to the general pool. They like to donate money to a very specific line item, so we’ve been very successful in getting money donated for scholarships as of late.” The program also appears to have been more successful in raising money directly from board members than in using potential board member influence and connections to appeal to others for funds.

5.7 Leadership

It appears clear from observation and interviews that strong school leadership is the most significant factor in board effectiveness. In the words of a long time board member, “You know, the most important ... part of the board is the leader of the school. The way the department chooses to interact with and use the board is the critical factor, in my opinion. If that person doesn’t want to use it, it doesn’t happen. If that person doesn’t know how to interact well, it doesn’t happen as well.” A school director who is comfortable in that leadership position, respected by the faculty and advisory board, who believes in the advisory process and makes it a priority, and who listens and seriously considers input from the advisory board is the most significant element in advisory board effectiveness. The school director sets the tone, determines the kind of people that are going to be on the board and sets the agenda for what topics the board will engage in. The advisory board chair is also an important role, as they serve as “cheerleader” and set

the example for the rest of the board members to follow. A good working relationship and unity of purpose between the school director and the board chair is important to effective board operation.

5.8 Board Membership

Membership of this advisory board consists of up to fifteen active members, and up to ten senior active members (former members who wish to stay involved in a non-voting role). At a recent meeting, a decision was made to increase the active membership limit to eighteen members. One of the key factors responsible for the effectiveness of this board is its composition. It has a large base of senior executives, financially secure and proven as leaders, with strong ties to the school and profession, and a desire to “give back” to the school and community as a significant motivation. The business segments and industries represented are diverse, from manufacturing to law, and from government to entrepreneurship. On top of this base were added some younger members who give a career perspective closer to that of a young college graduate, and bring the energy and enthusiasm of youth. The key ingredients looked for in all members is that “they have a deep caring for the profession and for this institution”, and that they “have the time and interest to support the department.” Rather than identify companies or industry segments and ask for representatives, the school has looked for individuals who bring the right experience and interest to the process. Potential members are identified through personal connections with school leadership, faculty and existing board members. As the dean of the college observed, “This is a people business, and nothing you can do in structure or policy will substitute for the right people. So if the board is not functional, it’s probably

because the department head of that department is not effectively utilizing it, or they have just got the wrong people on the board.”

5.8 Board Operation

The board meets twice a year, in the spring and fall, and meetings last for about five hours. Most meetings are typically followed by a social event, in some cases involving a larger student activity. There is an executive committee and three standing subcommittees (board development, financial development and academic programs). It is clear from observing board meetings that the board members enjoy their time with each other and look forward to the times when the board meets together. Advisory boards are structured in the College of Engineering such that the school-level advisory board chair automatically serves on the college level Board of Visitors, so that each school has an advocate in that forum.

5.10 Case Study Conclusions

The advisory board effectiveness model theorizes that an effective advisory board will have all four dimensions of organizational effectiveness in place – Human Relations, Internal Process, Rational Goal and Open Systems. The core of effective board operation is established with an environment of good working relationships, communication, sound organization and well defined roles. With this foundation in place, the effective board will establish clear objectives which can be accomplished using internal board member capabilities and resources, and will also use influence and relationships in the larger community to advance the interests of the educational program.

In this particular case study, all four elements of the effectiveness model were observed in operation. Specific factors seen as key ingredients for the success of this board were:

- Strong leadership by school directors who believed in the advisory board process. This was viewed as the most important ingredient for an effective advisory board relationship.
- Board membership consisting of a majority base of experienced, senior executives from a diversity of industries with strong commitment to the school and the profession, along with additional members who brought more diversity in age, experience and culture.
- Board meetings that were well organized, with consistent follow through on input from the board, such that board members felt that their time was well spent and that were adding value to the program.
- Explicit and well focused fundraising initiatives.

These characteristics resulted in a board that continues to be regarded as highly effective by all involved, contributing significantly to the program academically, financially and strategically.

CHAPTER 6: SURVEY ANALYSIS

6.0 Summary

This chapter presents the survey results and analysis and discusses analysis and conclusions that can be drawn from the survey. The first section summarizes the respondent characteristics and response rate from the survey. The statistical analysis methodology is then described. The rest of the analysis is organized by research question, indicating what conclusions can be drawn from the survey data with respect to each research question regarding board operation.

6.1 Survey Response

Of the 208 directors contacted, 43 individuals from 42 different engineering education programs at 25 summarizes the survey respondents. The response rate is somewhat low for on-line surveys as reported in some studies (Sheehan 2001), but appears consistent with response rates reported by other researchers at the University of Oklahoma. Response rates for surveys have been steadily declining year by year (Cook, Heath, & Thompson 2000), with some researchers reporting that the US population is being over-surveyed (Sheehan 2001). The e-mail inboxes of school directors are flooded with mail and requests for attention.

The number and breadth of responses from engineering school directors is sufficient to draw meaningful conclusions regarding board effectiveness. However, there were significantly fewer programs represented in the responses from advisory board

members. Forty-seven responses were received from advisory board members and board chairs, but only nine different engineering programs were represented in that sample. The sample was further limited in that two programs provided eighteen of the 47 responses. It appears that department directors were willing to complete the survey themselves, but were less willing to take the effort to forward it on to their board members. The relatively small number of programs represented in board member responses means that caution must be exercised in generalizing board member responses as representing all engineering programs. There are also too few programs represented to do significant paired comparisons of board member and school leadership responses within the same program.

Table 6.1. Survey responses by respondent category.

Role	Discipline	Number of Institutions	Number of Participants
School Director / Former Director / Faculty	Chemical Engineering	6	6
	Civil Engineering	7	7
	Computer Science	3	3
	Electrical / Computer Engineering	8	9
	Industrial Engineering	11	11
	Mechanical Engineering	7	7
	TOTAL	42	43
Board Chair / Former Chair	Civil Engineering	1	2
	Industrial Engineering	3	3
	TOTAL	4	5
Board Member	Civil Engineering	1	4
	Electrical / Computer Engineering	3	12
	Industrial Engineering	4	16
	Mechanical Engineering	1	9
	Unspecified		1
	TOTAL	9	42

All survey respondents answered the first sets of questions regarding advisory board objectives, institutional culture, and overall effectiveness. Following these questions, three out of 43 department directors and five out of 47 board members did not

answer any further questions in the survey. The rest of the respondents answered essentially all of the remaining questions. One board member respondent did not identify the university connection and another did not identify the academic discipline of his program.

This survey sample cannot claim to be a representative sample of engineering school directors or board members as there was a high degree of self-selection involved in the survey responses. Directors who responded to the survey probably had a stronger interest in the advisory board process than those who chose not to respond, and so were also more likely to have placed a higher priority on advisory board activity within their school. Board members who chose to respond to this survey were likely to be more engaged and supportive of the advisory board process than the typical advisory board member. It is also possible that only directors who were confident in their relationship with their advisory boards sent the survey on to their board members to complete. The absence of significant negative feedback with regard to the advisory board process tends to support this conjecture that the survey responses were biased towards a more positive view of the advisory board process.

6.2 Analysis Methodology

The statistical analyses performed in this study assume that 5-point Likert scale survey responses can be treated as interval data rather than ordinal in order to take advantage of more powerful parametric analysis tools. Opinion survey questions were set up with defined endpoints (e.g., 1 means strongly disagree and 5 means strongly agree) but no defined meanings for the intervening numbers. This was done deliberately

to make respondents think in terms of equal interval responses rather than just ordinal ranking. This allowed the response data from the survey to be considered “approximately” interval. There is debate in the literature on the appropriateness of using parametric analysis techniques with ordinal data (Knapp 1990; Velleman & Wilkinson 1993). Labovitz (1967, 153) shows that using rank-ordered data, particularly data that approximate an interval scale, “... rarely alters the results of statistical analysis to an appreciable degree.” Parametric statistical analysis was performed assuming a 95% confidence level ($\alpha = .05$). The practical implications of this approach are that the statistical significance (p value) of these tests should be viewed with caution, as the underlying data does not meet the strict requirements of data type and normality. In cases where the dependent variable was categorical, the responses were ranked and non-parametric analysis performed, using Spearman’s Rho rather than the Pearson moment of correlation, as there was no implication of equal intervals.

6.3 Overall Effectiveness – Research Question One

The first research questions asked, “*How is overall effectiveness defined and assessed?*” In terms of the effectiveness model, this question was focused on the model output which is the top level construct of advisory board effectiveness (Figure 6.1). Effectiveness is not single concept or a well-defined, easily quantifiable measure, and individuals involved in the process have their own view of how effective the organization is.

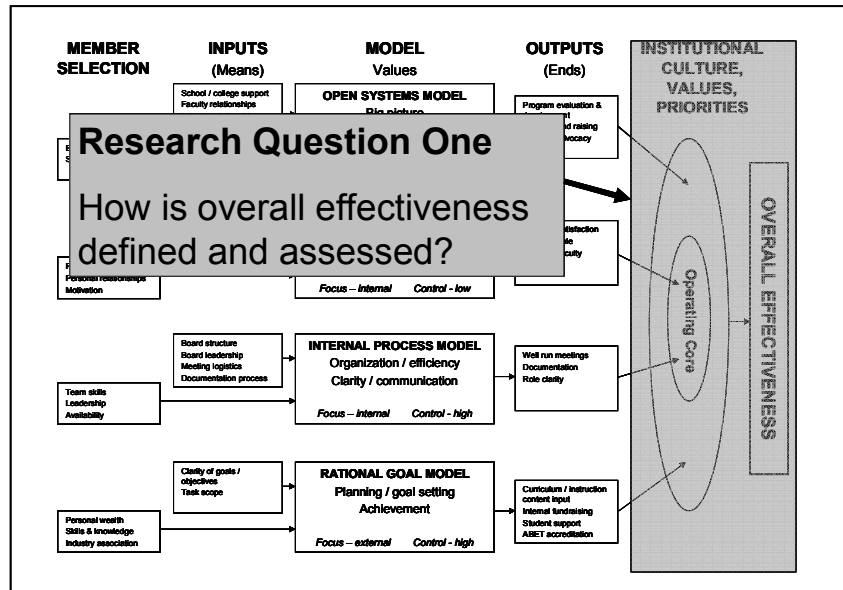


Figure 6.1. Research question one mapping to overall effectiveness model.

6.3.1 Overall Effectiveness

The primary assessment tool used in this study was a question in the survey that asked, “Overall, how effective has the advisory board been in accomplishing its objectives?” Responses were given in a 1 to 5 interval scale, with a 1 being “completely ineffective” and a 5 being “extremely effective”. Figure 6.2 summarizes the response to this question, broken out between school directors and board members.

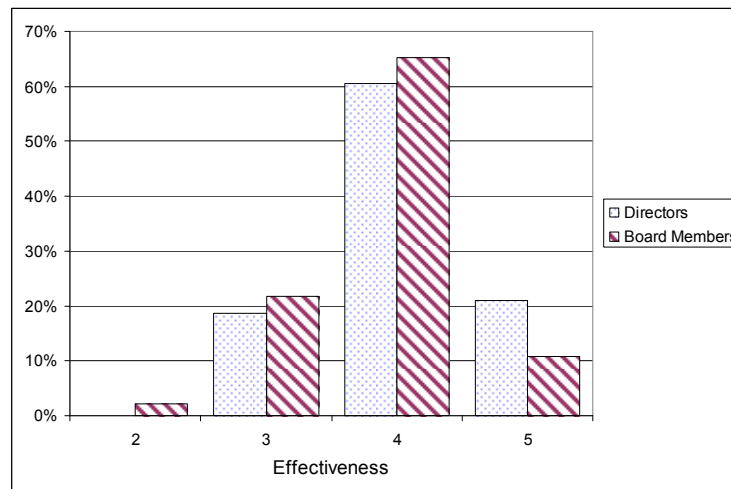


Figure 6.2. Survey response, overall effectiveness.

Clearly, respondents to this survey overall feel that their advisory board programs are quite effective. The mean response for school directors was 4.02 on a 1 to 5 scale, and 3.85 for board members. While directors gave a somewhat higher effectiveness evaluation than did board members, this difference is not statistically significant in a two sample t -test ($t_{86} = 1.31, p = 0.195$).

Throughout this analysis, it must be kept in mind that the responses of directors represented 42 different engineering programs, while the responses of board members represented only nine of these 42 programs. To do a comparison of responses within the same programs, a paired t -test was performed comparing the director response and the mean board member response. In this paired analysis, the mean effectiveness assessment of directors is 4.28, and that of members 3.78. This is a greater difference than seen previously, and is starting to approach statistical significance at the 95% confidence level ($t_8 = 1.94, p = 0.088$). This gives additional support to a tendency for program directors to think more highly of advisory board effectiveness than do board members.

Only nine directors forwarded the survey request on to their board members for participation, while 33 did not. It is possible that directors who felt more confident in their advisory board relationship and more positive about the potential responses of their board members would be more likely to forward the survey on to board members for their response. To test this hypothesis, a two sample t -test was performed comparing the overall effectiveness assessment of directors whose boards did participate in the survey with directors whose boards did not participate in the survey. While the effectiveness rating of directors with participating boards is higher (4.20 vs 3.97), the difference is not statistically significant ($t_{14} = 1.01, p = 0.331$).

Within the limited number of programs for which there were both director and board member responses, the correlation between director and board member assessment of overall effectiveness was explored. A correlation analysis between director and average member assessment of effectiveness of each program was performed, which showed very poor correlation between the two views ($r = 0.06, p = .872$). This raises the possibility that there could be quite different perspectives between directors and board members regarding overall advisory board effectiveness within the same program. This lack of correlation was driven largely by a difference of opinion on effectiveness between director and board members on one program, however, and when this data point is removed, the correlation becomes more positive, though not statistically significant. There are too few data points here to draw any definitive conclusions.

Comments from directors on their advisory board experience were generally positive, with some cautions: “The board works very effectively in recommending items for consideration, and slightly less effectively in delivering or implementing items,” “The advisory board has been effective, though they do have full-time jobs and can let items ... slip through the cracks,” “Board effectiveness has improved greatly over the past 6 years or so.” Some board members were very positive: “To this day, I am amazed at the impact our Advisory Board has on the department,” “We like to think that we are extremely effective,” “Board has become much more ingrained as part of the department – tighter relationships, communication, awareness.” One contrary view from a department director, whose program does not use an advisory board, seems to be a distinct outlier: “In my experience, advisory boards, both at the college and department

level, are mostly social exercises. ... I have yet to see an example of a successful industry advisory board.”

To summarize the survey results on overall effectiveness, both directors and board members, on average, believe their advisory board programs are quite effective. Directors, particularly those who enlisted the participation of their boards in this study, tended to have a somewhat higher view of effectiveness than did board members. There is not enough data to state with confidence how correlated the perspective of overall effectiveness is within a given program between directors and board members.

6.3.2 The Effectiveness Construct

To help better understand the construct of overall effectiveness, survey participants were asked additional questions that were believed related to overall effectiveness to provide broader perspective on this concept. The following five questions were asked, each in a 5 point interval scale, with a response of 1 meaning “strongly disagree” and a response of 5 meaning “strongly agree”:

- *Graduates of this university are generally very loyal and maintain close ties to the institution.*
- *The engineering school supported by this advisory board maintains a strong, healthy program.*
- *The advisory board adds significant value to the educational program.*
- *There is open and honest communication between the engineering school and the advisory board.*
- *The school gives serious consideration to input from the advisory board.*

A bivariate linear correlation analysis of the responses to these questions with the response regarding overall effectiveness was performed. Table 6.2 gives the results of this analysis, showing the mean response, the Pearson product moment correlation, and the statistical significance of that correlation. It can be seen that the responses to all

questions correlate positively with the response to overall effectiveness. Institutional loyalty showed a weaker correlation. The other four questions showed a strong correlation (highlighted).

Table 6.2. Correlation of effectiveness construct to overall effectiveness.

	Institutional loyalty	Program is healthy	Board adds value	Open communication	Consideration given to board input
Mean - directors	4.00	4.58	4.12	4.63	4.44
Mean - members	4.16	4.38	3.98	4.57	4.29
Correlation - <i>r</i>	0.252	0.534	0.617	0.489	0.583
Significance - <i>p</i>	0.018	0.000	0.000	0.000	0.000

The results of the correlation analysis are consistent with the hypothesis that all of these questions, with the exception of the question concerning institutional loyalty, represent different aspects or expressions of the construct of overall effectiveness. To further explore this hypothesis, a factor analysis was performed on the responses to these five questions and the question regarding overall effectiveness. Factor analysis is a statistical tool that is used to determine the degree of clustering, or the extent to which different variables are measuring the same concept. One or more factors are extracted from a correlation matrix, and the degree of loading of each variable to each potential factor computed. As seen in Table 6.3, a single factor (Factor 1) explains a high proportion of the variance, and all questions except the question regarding institutional loyalty load heavily into that factor. This indicates that these five questions are strongly interdependent and are viewed by respondents representing a similar idea. This can be

seen visually in Figure 6.2 in a loading plot. The strong correlation of each of these questions to overall effectiveness leads to the conclusion that these five assessments of board operation are all different expressions of the construct of overall effectiveness.

Table 6.3. Factor analysis loading, overall effectiveness variables.

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6
Loyalty	0.269	0.896	-0.316	0.063	-0.140	0.051
Health	0.715	0.160	0.590	0.281	-0.152	0.114
Value	0.807	0.070	-0.049	-0.032	0.564	0.150
Communication	0.740	-0.309	-0.322	0.442	-0.050	-0.235
Consideration	0.768	-0.348	-0.224	-0.231	-0.291	0.318
Overall Effectiveness	0.818	0.103	0.137	-0.417	-0.059	-0.351
Variance	3.0412	1.0599	0.6224	0.5070	0.4514	0.3181
% Var	0.507	0.177	0.104	0.084	0.075	0.053

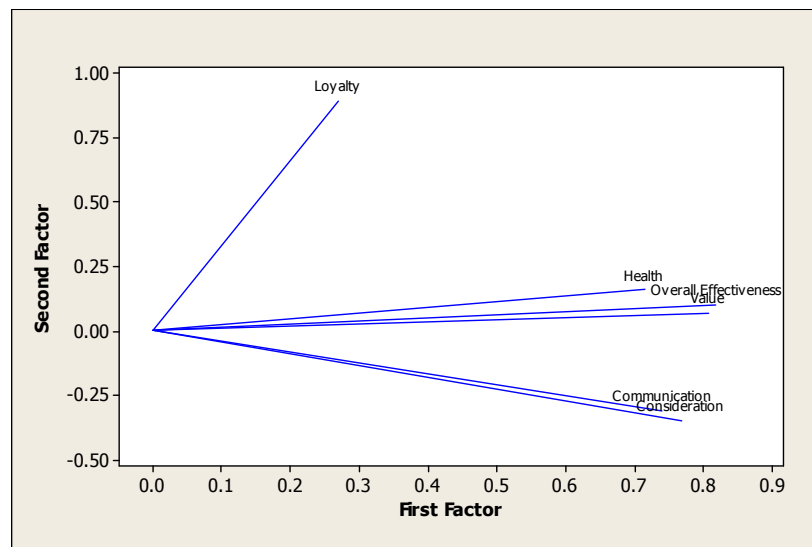


Figure 6.3. Factor analysis loading plot, overall effectiveness variables.

The question regarding institutional loyalty was included in response to a comment from one of the interviews in phase one of the study that perhaps programs that had a strong culture of institutional loyalty might be more likely to have strong advisory board programs. Though there is a positive correlation of loyalty to overall effectiveness,

it is weaker than the other questions, and does not show in the factor analysis as belonging in the same cluster as the other five questions.

The results of the correlation study and factor analysis confirm the hypothesis that an effective advisory board is associated with a strong, healthy engineering program in which there is open and honest communication between the school and the board, the school gives serious consideration to input from the board, and all involved feel that the advisory board is adding significant value to the program. Each of these characteristics are different facets of the same construct of overall effectiveness.

6.4 Elements of Effectiveness - Research Question Two

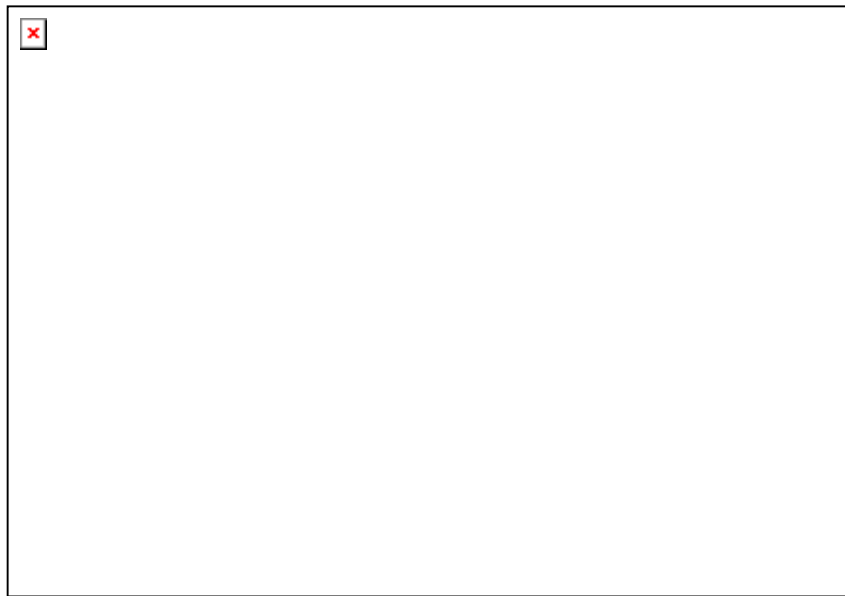


Figure 6.4. Research question two mapping to overall effectiveness model.

Research question two asks “*What are the elements that make up effectiveness, and how are they measured?*” Each of the four model areas (Human Relations, Internal Process, Rational Goal, and Open Systems) is examined. The focus here is on the

individual elements, or outputs of each model, that are the components of the overall effectiveness construct (Figure 6.4). Once again, response to survey questions is the measurement tool used for assessment. The survey was specifically designed with questions that address the outputs of each of the four effectiveness model areas.

6.4.1 Survey Questions, Research Question Two

Table 6.4 lists seventeen questions from the survey that are directed at this research question, gives a short title that is used to identify each question in the subsequent analysis, and indicates which of the four effectiveness model areas they are associated with. Each response was given on a 1 to 5 interval scale, with a 1 representing “completely ineffective” (section 5) or “strongly disagree” (sections 7 and 9), and a 5 being “extremely effective” or “strongly agree”, respectively. A “don’t know” or “no opinion” option was also given, and responses in this category were not considered in the analysis. This section covers the results of these survey questions broadly, and then discusses in more detail the implications of these results in the context of the effectiveness model and the objectives of an advisory board.

The first analysis done was to understand whether or not the effectiveness elements explored in these seventeen questions correlated significantly with overall effectiveness, and whether there was a difference in response between program directors and advisory board members that was significant to overall effectiveness. Table 6.5 shows the correlation of each question, or model output component, to overall effectiveness, which is the result of bivariate correlation analysis of each factor with overall effectiveness. The mean response, the number of respondents answering the

Table 6.4. Model output survey questions.

Survey Question	Title	Survey Section	Model Area
<i>Advisory board members get along well with each other.</i>	Working relationships	7.1	Human Relations
<i>The faculty is engaged and supportive of the advisory board process.</i>	Faculty engaged	7.1	Human Relations
<i>I feel that my time spent on advisory board activity is worthwhile.</i>	Time well spent	9.1	Human Relations
<i>I look forward to and enjoy participation in board meetings and board activities.</i>	Enjoy participation	9.1	Human Relations
<i>There are clear objectives and the mission of the board is well understood.</i>	Clear objectives	7.1	Internal Process
<i>Advisory board meetings are well run and time is well spent.</i>	Well run	7.1	Internal Process
<i>The advisory board process is well documented (agendas, minutes, etc.)</i>	Well documented	7.1	Internal Process
<i>The advisory board chair is effective in leadership of the board.</i>	Board chair effective	7.1	Internal Process
<i>The department director (engineering school head) is effective in directing board activity.</i>	Department director effective	7.1	Internal Process
<i>Advise program on curriculum content to meet industry needs.</i>	Curriculum input	5.2	Rational Goal
<i>Provide input and feedback to help meet ABET accreditation criteria.</i>	ABET accreditation	5.2	Rational Goal
<i>Assist with seminars, design projects, graduate placement, mentoring, etc.</i>	Program assistance	5.2	Rational Goal
<i>Raise funds for school use from board member personal resources.</i>	Internal fundraising	5.2	Rational Goal
<i>Provide input on program health and development opportunities.</i>	Health and development	5.2	Open Systems
<i>Serve as an advocate for the program with administration, community, industry, alumni, etc.</i>	Advocacy	5.2	Open Systems
<i>Use board member contacts and influence to raise funds from other sources.</i>	External fundraising	5.2	Open Systems
<i>Help promote and coordinate research opportunities with industry.</i>	Research	5.2	Open Systems

question, the Pearson correlation coefficient r (indicating the degree of correlation), and the p value (indicating the statistical significance of the correlation) are given for each question, along with the effectiveness model area addressed. The questions “Time well spent” and “Enjoy participation” were asked of board members only, while the remainder were asked of all participants. If the strength of the correlation was 0.35 or greater, the correlation is highlighted in the table below. While weaker correlations may be statistically significant, the decision was made throughout this analysis to use the threshold of $r > .35$ to help provide focus on those factors that are likely to have more significant influence. This particular threshold was based on a subjective “rule of thumb” that correlations greater than .35 are more notable. Correlation varied from strong and

statistically significant (e.g. curriculum input) to very weak (e.g. director response to internal fundraising), though all correlations were positive.

Table 6.5. Correlations of model outputs to overall effectiveness.

Question	Directors				Board members				Model
	Mean effectiveness	Responses	Correlation - <i>r</i>	Significance - <i>p</i>	Mean effectiveness	Responses	Correlation - <i>r</i>	Significance - <i>p</i>	
Working relationships	4.80	40	0.17	0.310	4.62	42	0.26	0.104	Human relations
Faculty engaged	3.73	40	0.37	0.018	4.22	41	0.55	0.000	Human relations
Time well spent					4.57	42	0.37	0.018	Human relations
Enjoy participation					4.52	42	0.32	0.037	Human relations
Clear objectives	3.85	40	0.38	0.014	4.02	42	0.32	0.041	Internal process
Well run	4.15	40	0.37	0.018	4.31	42	0.30	0.057	Internal process
Well documented	4.13	40	0.29	0.075	4.28	42	0.29	0.061	Internal process
Board chair effective	3.89	37	0.59	0.000	4.28	36	0.41	0.013	Internal process
Department director effective	4.41	39	0.17	0.293	4.26	42	0.26	0.096	Internal process
Curriculum Input	4.19	42	0.59	0.000	3.91	47	0.68	0.000	Rational goal
ABET accreditation	4.52	42	0.39	0.012	3.89	45	0.30	0.047	Rational goal
Program assistance	3.58	42	0.21	0.176	3.36	44	0.58	0.000	Rational goal
Internal fundraising	2.75	40	0.04	0.804	2.92	39	0.35	0.030	Rational goal
Health and development	3.90	40	0.46	0.003	4.07	46	0.58	0.000	Open systems
Advocacy	3.56	41	0.30	0.055	3.64	47	0.46	0.001	Open systems
External fundraising	2.66	41	0.26	0.107	2.59	37	0.24	0.163	Open systems
Research	2.73	40	0.21	0.193	3.04	45	0.57	0.000	Open systems

There were nine questions asked in survey section 7.1 and 9.1 regarding elements of effectiveness in the Human Relations and Internal Process model areas. These two areas constitute the operating environment of the advisory board. Figure 6.5 illustrates the response of directors and board members to these questions. Both directors and board members give very high ratings to the question regarding working relationships on the board (mean responses 4.80 and 4.62). The largest difference between directors and board members was seen in their assessment of how engaged the faculty is in the

advisory board process (board member response 4.22, director response 3.73). These responses will be analyzed in more detail in the discussion to follow.

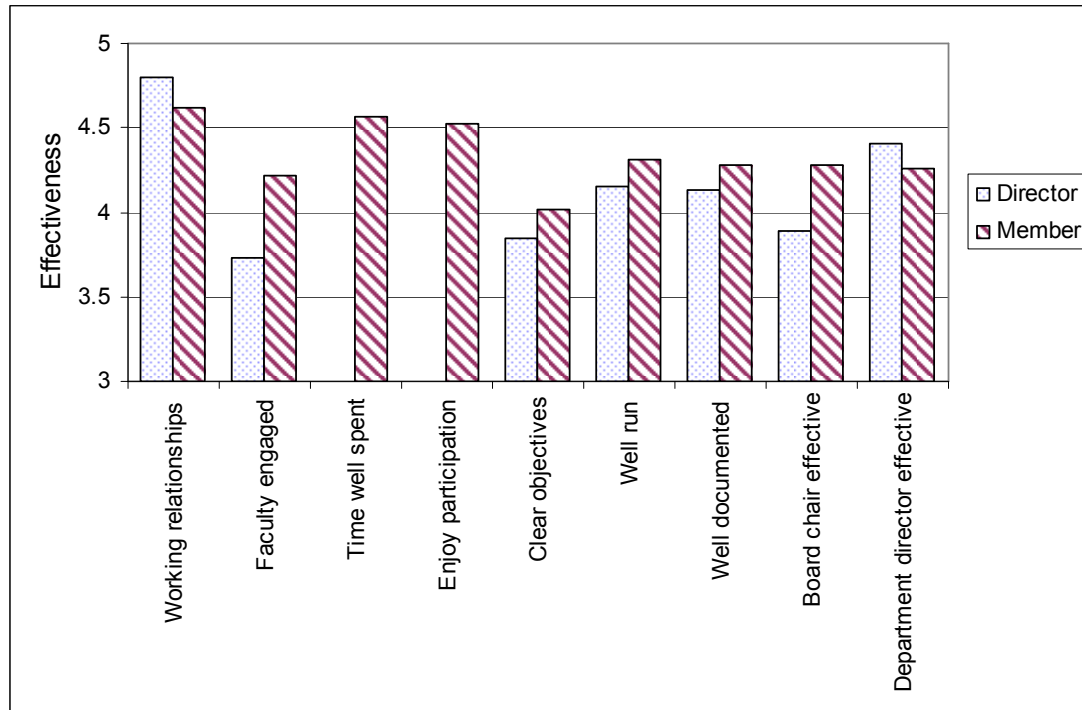


Figure 6.5. Survey response, Human Relations and Internal Process elements.

The eight identified advisory board objectives which are mapped as outputs of the Rational Goal and Open Systems models were explored with eight questions in survey section 5.2. Respondents were asked to give their assessment of the importance of each of these objectives, as well as the effectiveness of the board in addressing each of these objectives, all on a 1 to 5 scale. The responses are summarized in figure 6.6, broken out by respondent role (director or board member). Directors gave the highest importance and effectiveness to ABET accreditation, while board members gave the highest importance to curriculum input, and the greatest effectiveness to program health and development. These responses are analyzed in more detail in the discussion to follow.

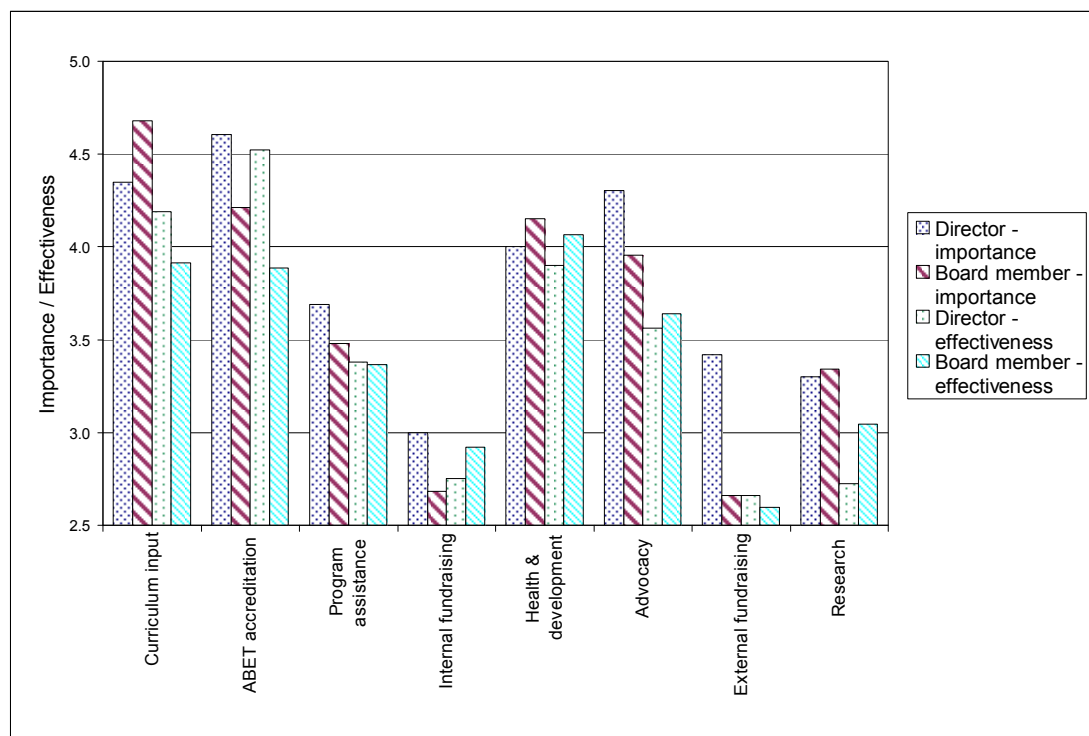


Figure 6.6. Survey response, board objectives.

Figure 6.7 shows the difference between importance and effectiveness for each of the objectives, again broken out by the role of the respondent. A positive number indicates that the importance of the objective was higher than the effectiveness - in other words, there is a performance gap or shortfall for that objective. From a director's perspective, the largest shortfalls in board effectiveness were seen in advocacy (0.78), external fundraising (0.78), and research (0.63), all Open System model components. From a board member's perspective, the largest gap was seen in curriculum input (0.77), which is a Rational Goal component. On average, board members indicated that boards were somewhat more effective in internal fundraising than the importance of that objective warranted, the only case in which a gap was not indicated.

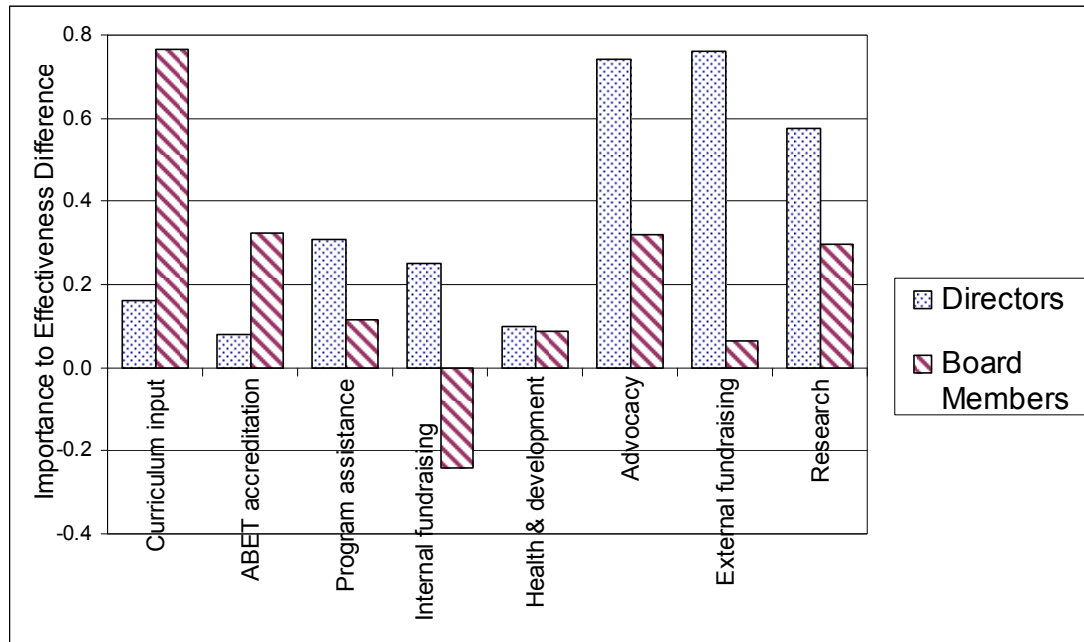


Figure 6.7. Board objectives, importance to effectiveness difference.

Figures 6.8 and 6.9 show an analysis of the mean response to the importance of each objective, broken out by respondent role, compared to the grand mean of responses for each role. This analysis shows whether the importance of each objective is statistically higher, lower, or the same as the average importance of all objectives, at a 95% confidence level. Those objectives which are above the statistical band of the mean are considered first tier objectives in terms of importance, those within the statistical mean band second tier, and those below third tier. From the director's perspective, ABET accreditation, curriculum input, and advocacy are of top importance. Board members agree that accreditation and curriculum input are of first tier importance, but consider program health and development of higher importance than advocacy. Both directors and board members regard fundraising (internal and external) as of relatively low importance.

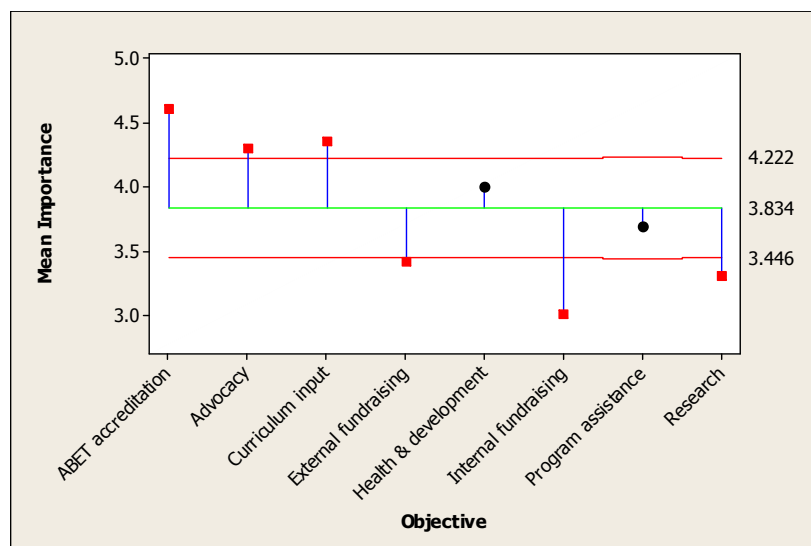


Figure 6.8. Analysis of Means, objective importance, directors.

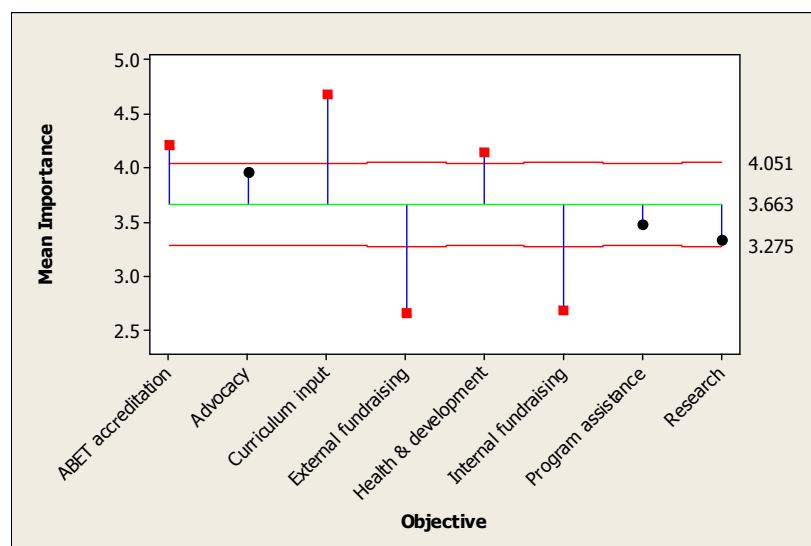


Figure 6.9. Analysis of Means, objective importance, board members.

Figure 6.10 shows the difference in average responses between directors and board members to questions about objective importance and objective effectiveness. A positive mean difference indicates that directors view the objective as more important (or effective) than do board members. Table 6.6 indicates whether this difference is statistically significant, and differences that are significant at a 95% confidence level are highlighted. The largest difference was seen in external fundraising, where directors

viewed this objective as significantly more important than did board members. Directors also viewed ABET accreditation as more important, and the board more effective in this area, than did board members. Board members think that more attention should be paid to curriculum input than do directors.

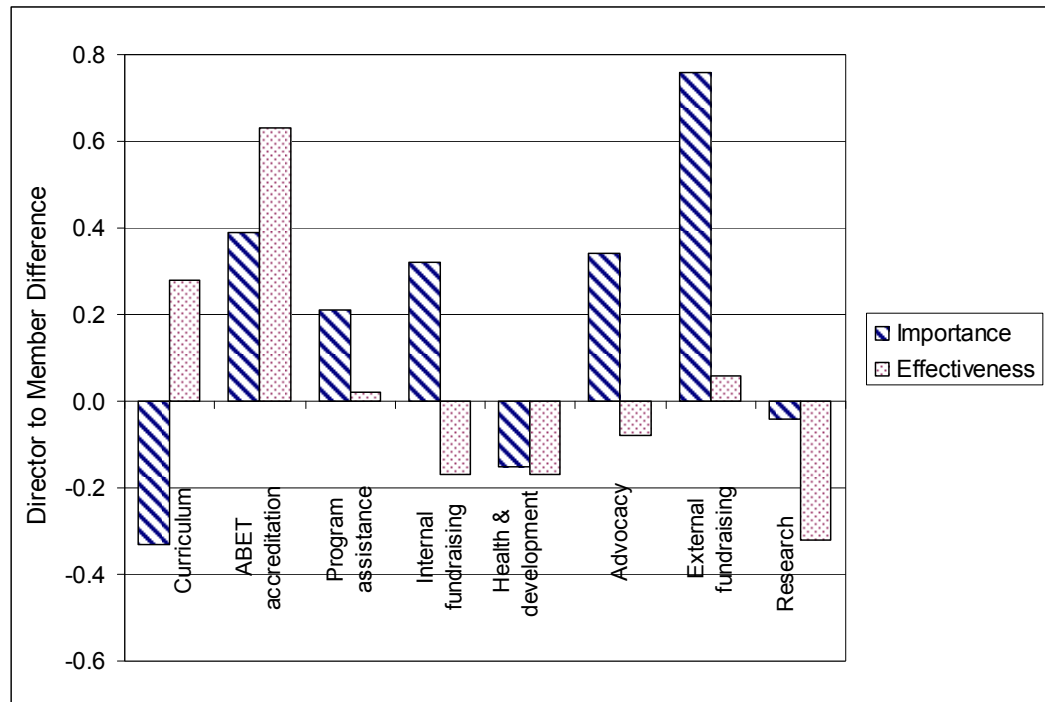


Figure 6.10. Board objectives, director to board member differences.

Table 6.6. Board objectives, director to board member differences.

		Curriculum input	ABET accreditation	Program assistance	Internal fundraising	Health & development	Advocacy	External fundraising	Research
Objective Importance	Mean difference	-0.33	0.39	0.21	0.32	-0.15	0.34	0.76	-0.04
	p value	0.011	0.037	0.256	0.250	0.455	0.063	0.005	0.873
Objective Effectiveness	Mean difference	0.28	0.63	0.02	-0.17	-0.17	-0.08	0.06	-0.32
	p value	0.138	0.000	0.940	0.543	0.383	0.717	0.793	0.157

Figure 6.11 illustrates the degree of variation between respondents in the importance of the different advisory board objectives. The measure is the standard deviation of responses in each category, and clearly there is significant disagreement among respondents as to the importance of some objectives (e.g., internal and external fundraising) and much greater agreement on others (e.g., curriculum input).

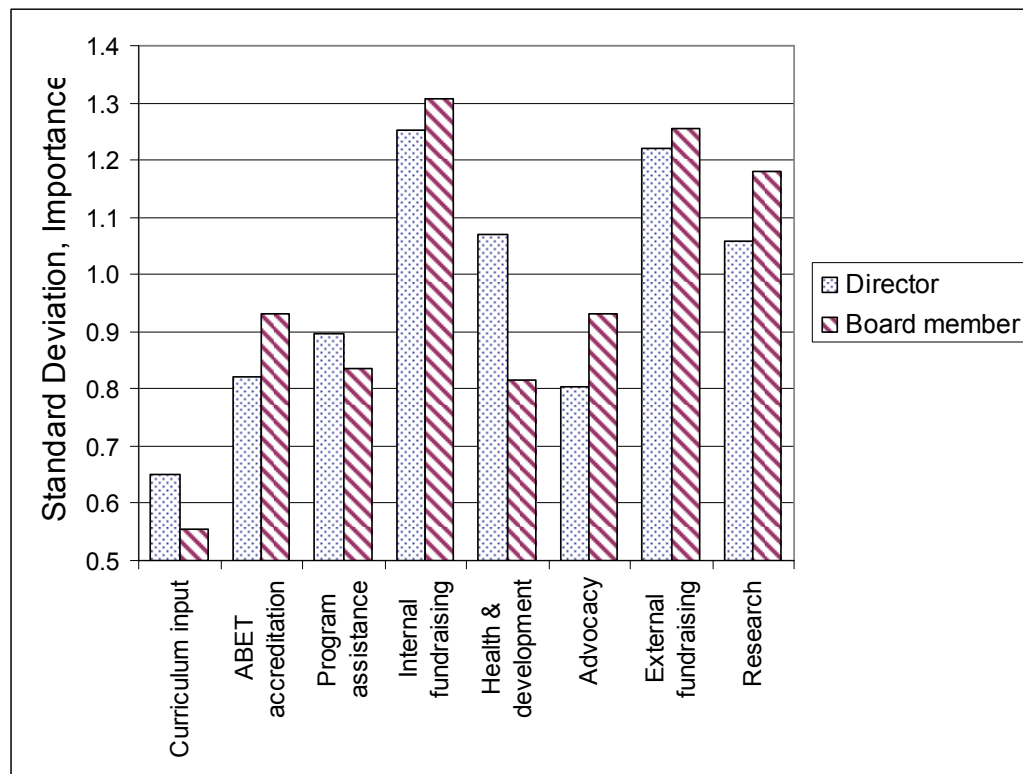


Figure 6.11. Standard deviation, objective importance.

6.4.2 Human Relations Model Effectiveness

There were four questions asked (Table 6.4) that mapped to the output of the Human Relations model. Two of these questions were asked of all respondents and two of board members only. The Human Relations model deals with interpersonal and working relationships in the board, and the questions were aimed at assessing how effective the board was in this aspect of its operation. Table 6.7 summarizes the Human

Relations questions and their correlation to overall effectiveness, excerpted from Table 6.5.

Table 6.7. Correlations of Human Relations factors to overall effectiveness.

Question	Directors				Board members				Model
	Mean effectiveness	Responses	Correlation - r	Significance - p	Mean effectiveness	Responses	Correlation - r	Significance - p	
Working relationships	4.80	40	0.17	0.310	4.62	42	0.26	0.104	Human relations
Faculty engaged	3.73	40	0.37	0.018	4.22	41	0.55	0.000	Human relations
Time well spent					4.57	42	0.37	0.018	Human relations
Enjoy participation					4.52	42	0.32	0.037	Human relations

A factor analysis loading plot (Figure 6.12) shows that two of the variables (“Time well spent” and “Enjoy participation”) are quite closely clustered, in a factor that represents how board members feel about their personal involvement.

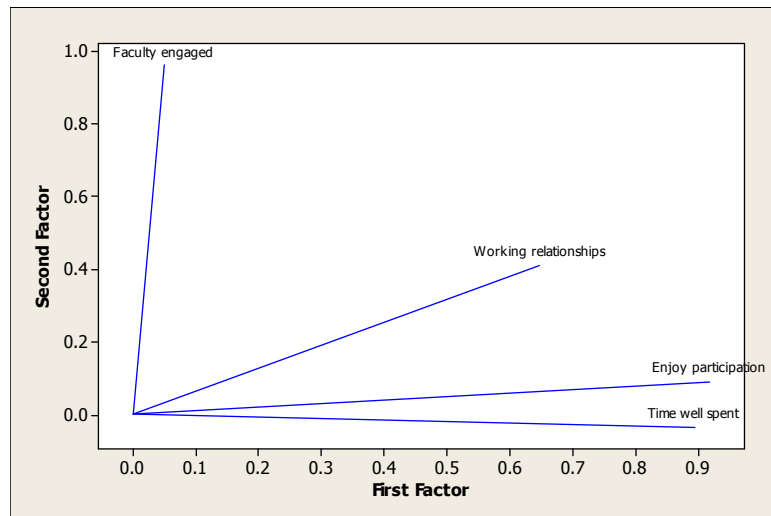


Figure 6.12. Factor analysis loading plot, Human Relations effectiveness.

The statement “*Advisory board members get along well with each other*” (working relationships) was affirmed with a mean response of 4.71 (4 or a 5 response by all but 1 of the respondents). There is a positive correlation to overall effectiveness, but

the statistical significance is reduced because there was such a limited range of responses to this question. Positive working relationships could be viewed as a foundational requirement for effective operation of a board in the Human Relations area, and do not appear to be an issue for the typical board. Board members comment on this aspect as a strength of their programs: “We work well together”, and “...closeness of the board.”

The questions regarding “time well spent” and “enjoy participation” show a great deal of commonality in the factor analysis, and were not presented to department directors. The mean response for “time well spent” was 4.57, and for “enjoy participation” 4.52. Both show statistically significant correlation to overall effectiveness ($r = .37$ and $r = .32$, respectively). Board members generally feel very positive about their participation in the advisory board process.

The question “faculty engaged” had the strongest correlation from board members with overall effectiveness of any variable in the Human Relations model ($r = .55$). The correlation was not as strong, but still significant, from program directors ($r = .37$). Having engaged faculty would appear to be a positive indicator of the health of an advisory board. Board members gave a mean response to this question of 4.22, and program directors 3.72. This difference is significant at a 95% confidence level ($t_{78} = 2.62, p = .011$). The implication is that board members have a more positive view of faculty engagement than do department directors. It is likely that board members interact primarily with faculty who are interested and involved in the board process and are present at meetings, and directors have a larger view that includes faculty who do not choose to spend time and energy in this process.

In summary, the output of the Human Relations model correlates strongly to overall board effectiveness, supporting the hypothesis of the importance of the human relations element in the effectiveness model. The strongest indicators of effectiveness in this area are the engagement of the faculty and the assessment of board members that their time is well spent in board activities. Participants gave high ratings of board effectiveness in the Human Relations area (average of 4.41 across all four measures), indicating that, for most boards, human relations are not an issue. In general, board members feel very good about their participation in the advisory board process. One board member commented, “I am extremely proud to be a member and strongly feel that we have a great impact on graduating students and are helping them to be better prepared for their future careers!” Another board member summarized the feelings of the board: “Board members are passionate about their role.”

6.4.3 Internal Process Model Effectiveness

Five questions regarding board operation were asked in section 7.1 of the survey (Table 6.4) that map to the output of the Internal Process model. These questions are titled “Clear objectives”, “Well run”, “Well documented”, “Board chair effective”, and “Department director effective”. All show positive correlation to overall effectiveness, with “Board chair effective” the strongest correlation, and “Department chair effective” the weakest correlation and not statistically significant (Table 6.8).

Table 6.8. Correlations of Internal Process factors to overall effectiveness.

Question	Directors				Board members				Model
	Mean effectiveness	Responses	Correlation - r	Significance - p	Mean effectiveness	Responses	Correlation - r	Significance - p	
Clear objectives	3.85	40	0.38	0.014	4.02	42	0.32	0.041	Internal process
Well run	4.15	40	0.37	0.018	4.31	42	0.30	0.057	Internal process
Well documented	4.13	40	0.29	0.075	4.28	42	0.29	0.061	Internal process
Board chair effective	3.89	37	0.59	0.000	4.28	36	0.41	0.013	Internal process
Department director effective	4.41	39	0.17	0.293	4.26	42	0.26	0.096	Internal process

A factor analysis (Figure 6.13) shows that “Clear objectives”, “Well run”, and “Well documented” are closely clustered in a factor that has to do with operating characteristics of the board.

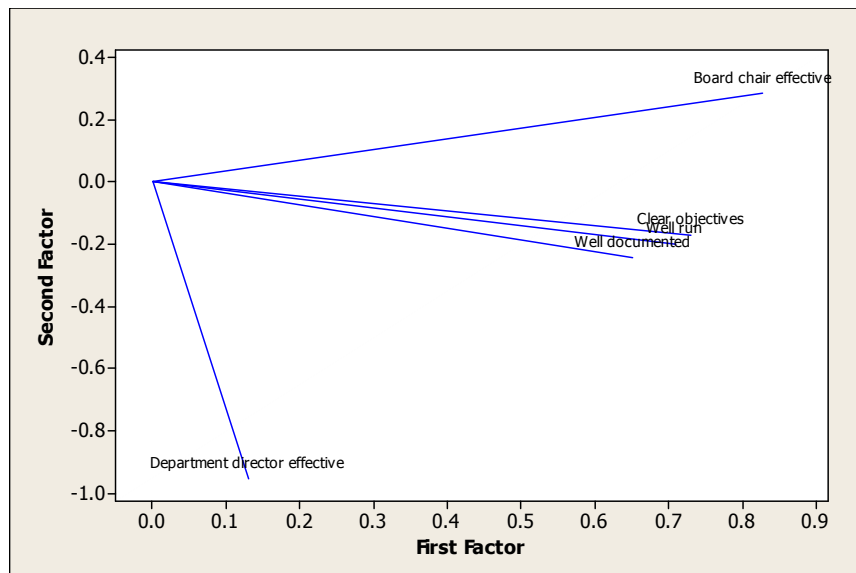


Figure 6.13. Factor analysis loading plot, Internal Process effectiveness.

These three variables all show moderate positive correlation to overall effectiveness. The correlations of “Clear objectives” ($r = .38$) and “Well run” ($r = .37$) are stronger from the directors’ perspective, and the rest of the correlations are around the

threshold of statistical significance. The mean response for all three questions was between 3.94 and 4.23, and there was not a statistically significant difference between the responses of board members and directors ($t_{79} = 1.11, p = 0.269$; $t_{79} = 1.11, p = 0.271$; $t_{75} = 0.97, p = 0.337$).

The variable “Board chair effective” was given a mean response of 4.28 by board members, and 3.89 by directors. This difference is statistically significant ($t_{70} = 2.23, p = 0.029$), indicating that board members tend to think more highly of the job their leader is doing than do department directors, though the overall assessment of both is quite positive. Directors give this variable the strongest correlation to overall effectiveness of any of the Internal Process variables ($r = .59$), emphasizing how important the role of the board chair is in their view. Comments by a department director underscore this observation: “The board’s operating effectiveness is in direct relationship to the leadership of the chairman.” It is interesting to note, however, that there were a large number of missing responses to this question (five of forty-two directors, eleven of forty-seven board members). One director commented, “There is no Industrial Advisory Committee chair”, and a board member, “We don’t have a board chair - the meetings are led by the Department Chair”, indicating that some programs may not use this type of internal leadership structure for the board.

The variable “Department director effective” was given a very positive response, with a director rating of 4.41 and a board member rating of 4.26. The correlation to overall effectiveness was positive but weak ($r = .17$ and $r = .26$). Department directors in general give themselves high marks in management of advisory board activities, and board members tend to agree, fairly independent of their assessment of overall advisory

board performance. When the smaller set of data is examined in which both directors and board members from the same programs are responding to this question, there is actually an inverse correlation on director effectiveness between directors and board members ($r = -.38, p = .448$). While this is not statistically significant, the absence of a positive correlation raises the possibility that department directors and board members have different criteria in mind regarding the role of the department director as it relates to the advisory board. There are too little data here to draw any definitive conclusions.

To summarize, the outputs of the Internal Process model correlate strongly with overall effectiveness, again supporting the hypothesis of the overall effectiveness model. The strongest correlation in this area is with board chair effectiveness, emphasizing the importance of this role. The average response to all five measures in this area is 4.16, indicating that most programs feel like the internal operating systems of the board are in good condition.

6.4.4 Rational Goal Model Effectiveness

With the Rational Goal model comes the first discussion of specific advisory board objectives. Objectives in this space are those that the board can accomplish with internal planning and resources, and are identified as “Curriculum input”, “ABET accreditation”, “Program assistance”, and “Internal fundraising”. Table 6.9 summarizes the correlation of director and board member assessment of effectiveness for each of these objectives with overall effectiveness.

Table 6.9. Correlations of Rational Goal objective effectiveness to overall effectiveness.

Question	Directors				Board members				Model
	Mean effectiveness	Responses	Correlation	P value	Mean effectiveness	Responses	Correlation	P value	
Curriculum Input	4.19	42	0.59	0.000	3.91	47	0.68	0.000	Rational goal
ABET accreditation	4.52	42	0.39	0.012	3.89	45	0.30	0.047	Rational goal
Program assistance	3.58	42	0.21	0.176	3.36	44	0.58	0.000	Rational goal
Internal fundraising	2.75	40	0.04	0.804	2.92	39	0.35	0.030	Rational goal

In a factor analysis on these variables, the first two objectives are closely related (“Curriculum input” and “Program assistance”), a factor that has to do with direct involvement in the student educational process (Figure 6.14).

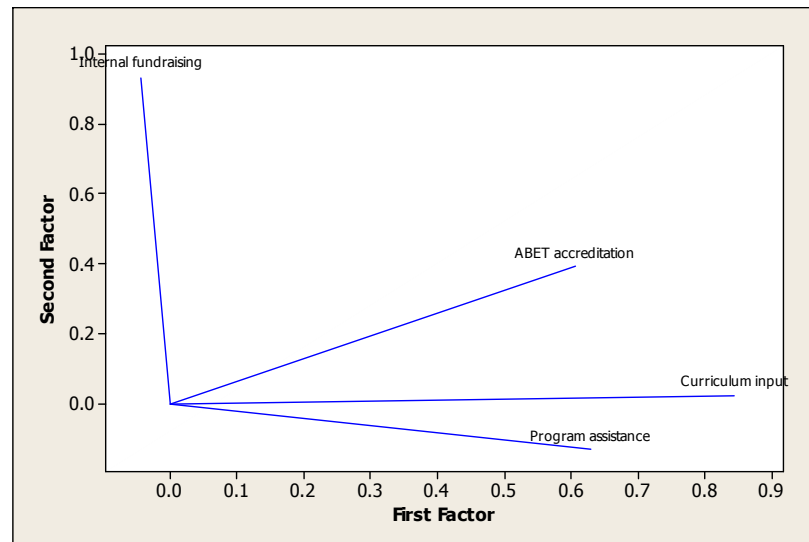


Figure 6.14. Factor analysis loading plot, Rational Goal objective effectiveness.

In literature and discussion with board members, curriculum input is most often mentioned as a board objective, and the survey confirms its importance. Curriculum input has the strongest correlation to overall effectiveness of any of the variables

analyzed, from both directors and board members ($r = .59$ and $r = .68$). Board members give it the highest importance (4.68) of any of the objectives, and directors give it an importance rating of 4.35. The standard deviation of responses of both importance and effectiveness were the lowest of any of the objectives, indicating that there is generally close agreement among respondents. Directors appear to be reasonably satisfied with the contribution of the board in this area (importance to effectiveness difference of 0.17), but board members show the largest gap between importance and effectiveness (0.77, Figure 6.7). This is one area where frustration showed up in comments on the survey by a couple of board members. One member expressed disillusionment about the board's ability to influence curriculum, with the comment, "I am considering withdrawing from this board since I feel ineffectual in it." Another expressed the concern: "Change is too slow to react to market needs." Directors recognize the importance of this role but are more cautious, believing that board members sometimes have too narrow a perspective on academic and curriculum issues and do not "fully understand academia". Because of the high correlation to overall effectiveness, this is an area of board operation that needs clear communication and aligned expectations between administration and board members.

Department directors give the highest importance rating of any board objective to assisting with the ABET accreditation process (4.60) and show a strong correlation of this variable with overall effectiveness ($r = .39$). For directors, ABET accreditation is an essential element of their program and advisory board input has become a vital part of this process. One director commented, "I have been using the board primarily to help with the undergraduate accreditation processes." Fortunately, department directors also

give very high marks to the effectiveness of the board in this area (4.52), indicating that from their perspective advisory boards in general are being used effectively to accomplish this objective. Board members view ABET input as important (4.21), although not to the same degree as department directors, but give a rating of only 3.89 to effectiveness. Both of these differences from director assessment are statistically significant (Table 6.6). It would appear that board members do not always adequately understand the critical role their input plays in the ABET assessment process. As board members seem to be contributing more in this area than they realize, this could present an opportunity for directors to give some positive reinforcement to the board.

“Program assistance” is the title given to activities by individual board members and the board as a whole which assist the students and the program through members own time and efforts. This includes such areas as assisting with seminars, design projects, graduate placement, and mentoring. Department directors give an importance rating of 3.58 and an effectiveness rating of 3.37, and board members give an importance rating of 3.69 and effectiveness of 3.38. None of these differences are statistically significant. Program assistance is viewed as a “second tier” objective, with curriculum input and ABET assistance being in the first tier (Figures 6.8 and 6.9). It shows as correlating strongly with overall effectiveness by board members ($r = .58$), but not as strongly or significantly by directors ($r = .21$).

The topic of fundraising seems to spark the most comments and the widest variety of opinion among advisory board programs. The standard deviation of responses from directors and members concerning both internal and external fundraising shows the highest variation of any of the objective areas (Figure 6.11). Internal fundraising refers to

direct contributions to the program from board members' personal resources, and is thus mapped into the Rational Goal model. External fundraising is covered in the discussion under the Open Systems model. Internal fundraising is given the lowest average importance rating of any of the Rational Goal objectives by both directors (3.0) and members (2.68), though the standard deviation is high (1.25 and 1.31). What clearly is occurring here is that some programs put a high emphasis on internal fundraising while others do not. Several programs have made a deliberate decision to keep the advisory board out of the development or fundraising process. "We do not view our advisory committee as a fundraising tool. We have a different group that serves that purpose", notes one director. A board member says similarly, "Our advisory board is not involved in fundraising. Our alumni academy takes care of that function." Other programs are effectively at the same point without a formal policy: "We as a board avoid money raising, aka 'development'. Some of us are obviously donors but it never comes up in meetings or otherwise." In other cases, board members express frustration, "Education of students seems secondary to fundraising", as do directors, for the opposite reason: "The board has not provided leadership on fundraising." On the other hand, several programs mentioned financial support and funding of scholarships as one of the strengths of the advisory board. Clearly, fundraising is a topic about which everyone has an opinion and there is much disagreement. Internal fundraising effectiveness showed essentially no correlation to overall effectiveness from department directors ($r = .04$), and a moderate correlation from board members ($r = .35$). Figure 6.15 shows an interesting pattern in the correlation of internal fundraising importance to overall effectiveness. While one cannot generalize too strongly from this data, it appears that program directors who place a high

emphasis on internal fundraising from their board are more likely to be disappointed in the overall performance of the board. On the other hand, board members who believe that fundraising is an important role for the board are more likely to view the board as effective. One possible explanation is that of “locus of control”. Personal fundraising is out of the direct control of department directors and within the control of board members, and this may result in differing views of effectiveness. One implication of this could be that any fundraising emphasis should come internally from within the board rather than from department leadership or external pressure. Maximum effectiveness seems to be associated with department leadership taking a clear stand that internal fundraising is not the role of the board, or board members clearly identifying that internal fundraising is a priority.

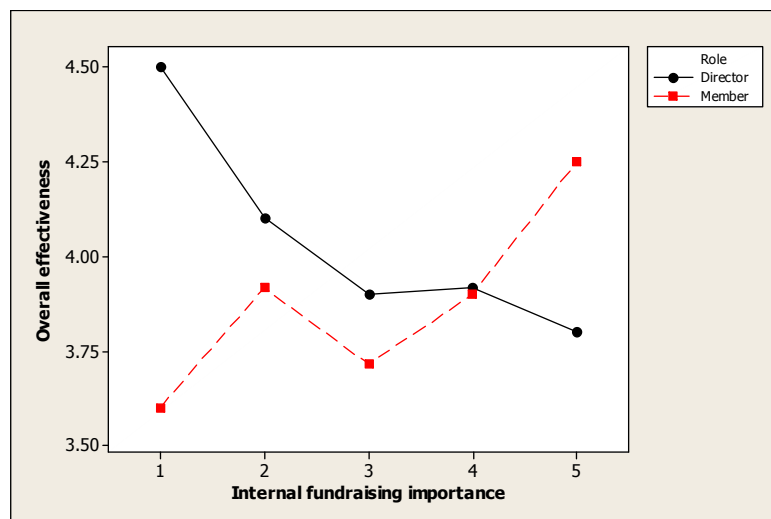


Figure 6.15. Internal fundraising importance versus overall board effectiveness.

To summarize the objectives associated with the Rational Goal Model, curriculum input and ABET accreditation support are viewed as the most important objectives of an advisory board, and both correlate strongly to overall effectiveness. Board members

show the largest gap between importance and effectiveness in the area of curriculum input, making it likely that perceived board performance in this area is critical to board member assessment of overall effectiveness. Program assistance is a “second tier” objective, with a positive correlation to overall performance. Internal fundraising is viewed quite differently by different boards, with some making it a high priority and others deliberately keeping the board out of fundraising activity.

6.4.5 Open Systems Model Effectiveness

Objectives in the Open Systems model are program health and development, program advocacy, external fundraising, and research support. All of these objectives require external coordination by the board and involve resources outside the direct control of the board. Table 6.10 shows the correlation of the effectiveness assessment of these objectives to overall effectiveness.

Table 6.10. Correlations of Open Systems objective effectiveness to overall effectiveness.

Question	Directors				Board members				Model
	Mean effectiveness	Responses	Correlation - <i>r</i>	Significance - <i>p</i>	Mean effectiveness	Responses	Correlation - <i>r</i>	Significance - <i>p</i>	
Health and development	3.90	40	0.46	0.003	4.07	46	0.58	0.000	Open systems
Advocacy	3.56	41	0.30	0.055	3.64	47	0.46	0.001	Open systems
External fundraising	2.66	41	0.26	0.107	2.59	37	0.24	0.163	Open systems
Research	2.73	40	0.21	0.193	3.04	45	0.57	0.000	Open systems

A factor analysis in this space does not show strong clustering (Figure 6.16), indicating that these objectives are not closely aligned.

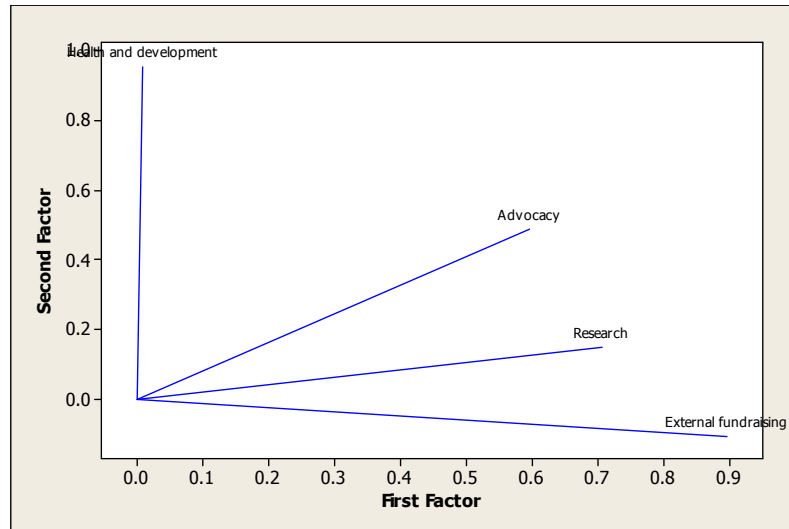


Figure 6.16. Factor analysis loading plot, Open Systems objective effectiveness.

“Program health and development” is activity in which the advisory board works with the program to evaluate and assist in its overall health and development. The survey did not clearly define the meaning of “health and development”, but this could include activities such as strategic planning, competitive program analysis, review of financial health, and assistance in recruiting or interviewing new faculty. Program directors give this objective an importance of 4.00 (second tier, Figure 6.8), and an effectiveness of 3.90, indicating that they are fairly satisfied overall with board performance in this area. Board members give an importance of 4.15 and effectiveness of 4.07. (The higher importance given by board members is not statistically significant.) For board members, this objective shows one of the strongest correlations to overall effectiveness ($r = .58$), and the correlation by directors is strong as well ($r = .46$). This is the most significant of any of the Open Systems objectives in terms of correlation to overall effectiveness for both directors and board members, and the only one that is statistically significant as viewed by directors.

Program advocacy with industry, community, university administration, and potential students is viewed as a top tier objective of advisory boards by program directors (importance 4.30, Figure 6.8). Directors also show one of the largest gaps between importance and effectiveness in this area (Figure 6.7), with an effectiveness rating of 3.56. This difference is statistically significant ($t_{73} = 3.63, p = 0.001$). Clearly, directors would like advisory boards to be stronger advocates for their programs than they feel that they are. Advocacy is an activity that occurs in settings and times other than regularly scheduled board meetings, and several directors commented on the limited time availability of board members. A representative director comment is, “They are busy people and limited in their time available outside of the regular board meetings.” Board members do not see this objective with the same importance (3.96) and the gap to effectiveness is less (effectiveness rating 3.64). Board members do show advocacy, however, as strongly correlating with overall effectiveness ($r = .46$). The correlation to overall effectiveness by directors is weaker ($r = .30$), for reasons that are not clear. This is also an area where there is an inverse correlation between the assessments of directors and of board members in the small set of programs for which there are responses from both ($r = -1.29, p = .267$). While there are limited data and no statistical significance in this finding, a picture does seem to emerge that indicates that there may be different perspectives between directors and board members as to what the role of advocacy for advisory boards should be.

External fundraising (using the influence of the board with individuals or organizations outside of the board to raise funds) has the same large variation in response as did internal fundraising, discussed earlier. Board members give it the lowest

importance rating of any objective (2.66), but program directors give it a much higher importance (3.42). This is the largest disconnect of any objective between directors and board members (Table 6.6) and is statistically significant ($t_{84} = 2.86, p = 0.005$).

Directors also see the largest gap between importance and effectiveness in this objective (3.42 to 2.64), which is also statistically significant ($t_{82} = 3.29, p = .001$). Clearly, many directors would like to see advisory boards do a more effective job at using their influence in this area. Board members, however, see almost no gap between importance and effectiveness (2.66 to 2.59). The use of advisory boards for external fundraising may be largely “wishful thinking” on the part of program directors, as there is not a strong correlation of this objective to overall effectiveness (Table 6.10).

The last objective in the Open Systems model is research. This involves using the board to help identify or coordinate opportunities for research for the program. As the scope of research was not defined in this question, there is the potential for differences of interpretation, from involvement in a senior design project at one end of the spectrum to a full scale research center at the other. Though this is a third tier objective for directors (Figure 6.7), a large and statistically significant gap (Figure 6.3, $t_{82} = 2.67, p = .009$) shows up between the desires of program directors (importance = 3.30) and the performance of the board (effectiveness = 2.73). Board members view research with similar importance (3.34) but view the effectiveness of the board higher in this area (3.04). As with advocacy, research shows a strong correlation to overall effectiveness by board members ($r = .57$) but not by directors ($r = .21$), for reasons again unclear. It is possible that board members have a looser definition of what is considered research than do program directors.

In summary, program health and development shows the strongest correlation of any of the Open Systems objectives to overall effectiveness. Directors would like to see boards contribute more in the areas of advocacy, external fundraising and research, though none of these show as strong drivers of overall effectiveness from the directors' perspective.

6.4.6 Conclusions, Research Question Two

Each of the effectiveness model elements (Human Relations, Internal Process, Rational Goal, and Open Systems) have outputs which are components of the overall effectiveness construct, as shown by strong correlation with the overall effectiveness assessment. An effective advisory board program will work to ensure that all four elements are in good operation.

The overall effectiveness model postulated that the mapping of the output of model elements to overall effectiveness would vary with institutional culture, values, and priorities. However, it also appears that directors and board members have different perspectives in some cases of what an effective board looks like. Board members tend to show that Human Relations elements are more significant to overall effectiveness than do directors, and directors tend to show higher correlations between Internal Process elements and overall effectiveness than do board members. This could be stated as a general tendency for board members to place more emphasis on how they feel about their participation in the process in their evaluation of program effectiveness, and program directors to be more concerned about the “nuts and bolts” of board operation in their evaluation.

Of the eight identified objectives of an advisory board (which are outputs of the Rational Goal and Open Systems models), curriculum input shows the highest correlation to overall effectiveness by both directors and board members, and program health and development also correlates strongly as viewed by both groups. Program directors place a high emphasis on ABET accreditation. There is significant disagreement between and within programs about the appropriate role of fundraising, both internal and external.

6.5 Factors Influencing Effectiveness - Research Question Three

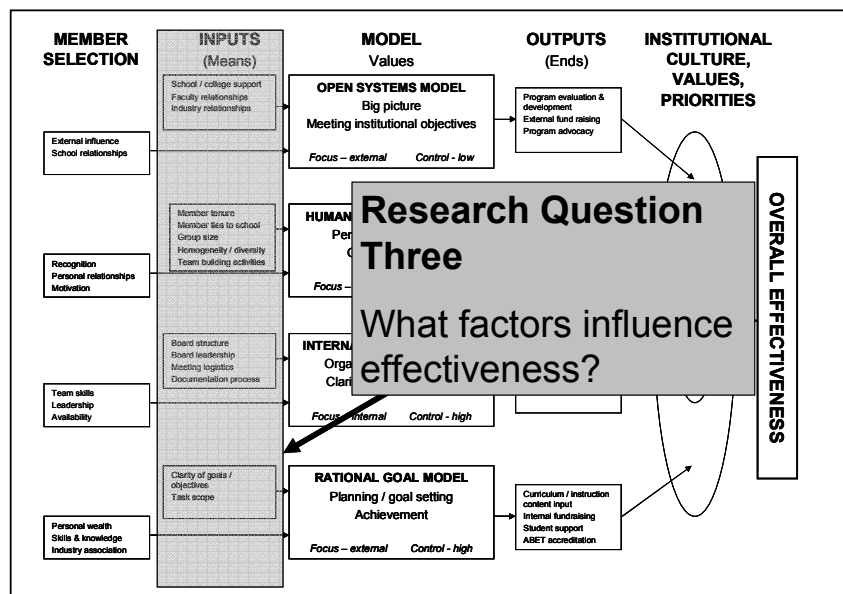


Figure 6.17. Research question three mapping to overall effectiveness model.

Research question three explores which operating variables influence board effectiveness in each of the four model areas, as illustrated in Figure 6.17. Questions about board demographics and the selection of board members are explored in research question four.

6.5.1 Survey Questions and Responses Regarding Board Operation

A series of questions was asked of directors and board members to assess the operation of the board. Some questions were asked of all respondents, and others of directors or board members only. Table 6.11 lists ten questions that were asked in an opinion format, and indicates to whom they were addressed. Response was on a 1 to 5 scale (1 = strongly disagree, 5 = strongly agree). Figure 6.18 shows the responses to these questions.

Table 6.11. Survey questions regarding board operation.

Survey Question	Title	Respondents
<i>Efforts are made to encourage socialization among board members and with faculty</i>	<i>Socialization</i>	<i>All</i>
<i>There is a wide range of age, culture, background and industry experience represented on the board</i>	<i>Diversity</i>	<i>All</i>
<i>Operation of this advisory board is well coordinated with the rest of the college or university</i>	<i>Coordination</i>	<i>All</i>
<i>I feel comfortable in my role coordinating the work of the advisory board</i>	<i>Director comfortable</i>	<i>Directors</i>
<i>I attend all of the advisory board meetings</i>	<i>Attend meetings</i>	<i>Board Members</i>
<i>I am involved outside of the board meetings in volunteer activity with the program and/or its students</i>	<i>Involvement outside meetings</i>	<i>Board Members</i>
<i>The program is clear and up front regarding expectations about financial contributions from board members</i>	<i>Clear fundraising expectations</i>	<i>Board Members</i>
<i>I am comfortable with the priority and attention given to fundraising by the board</i>	<i>Comfort with fundraising</i>	<i>Board Members</i>
<i>The board is given candid and complete information regarding the state of the educational program</i>	<i>Candid communication</i>	<i>Board Members</i>
<i>The school follows up on actions from the advisory board meetings</i>	<i>Follow up</i>	<i>Board Members</i>

Another group of questions was asked requesting data on board operation, with the responses in categorical form. A few of these questions were asked to all respondents, but most were asked of directors only, as they were felt to be in the best position to know specific information regarding board structure. These responses are shown in Figure 6.19. Additional information was requested of board members regarding their engagement with the board, seen in Figure 6.20. In every case, the source of the data is indicated on the graph (directors, board members, or both).

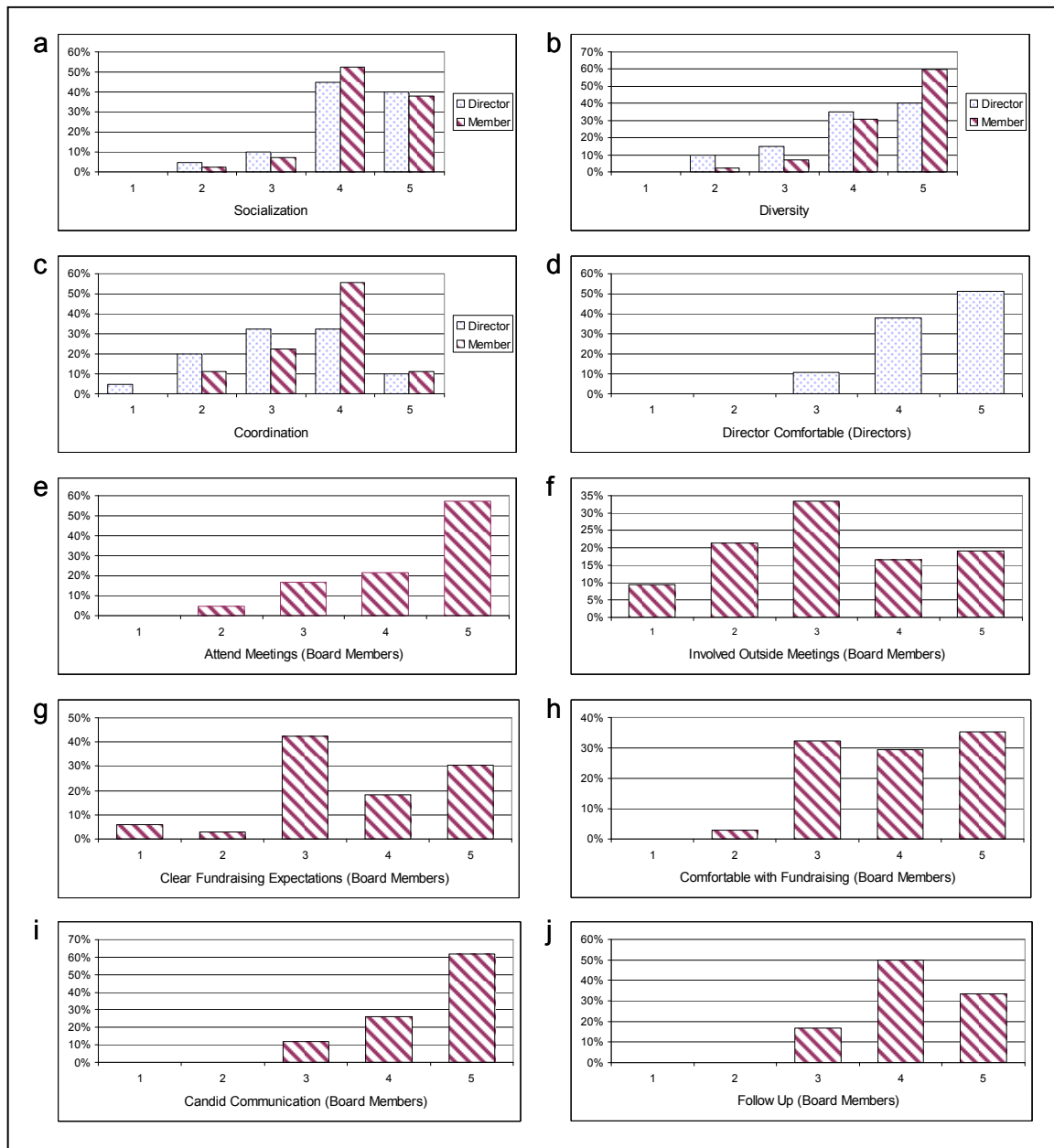


Figure 6.18. Survey responses, assessment of board operation.

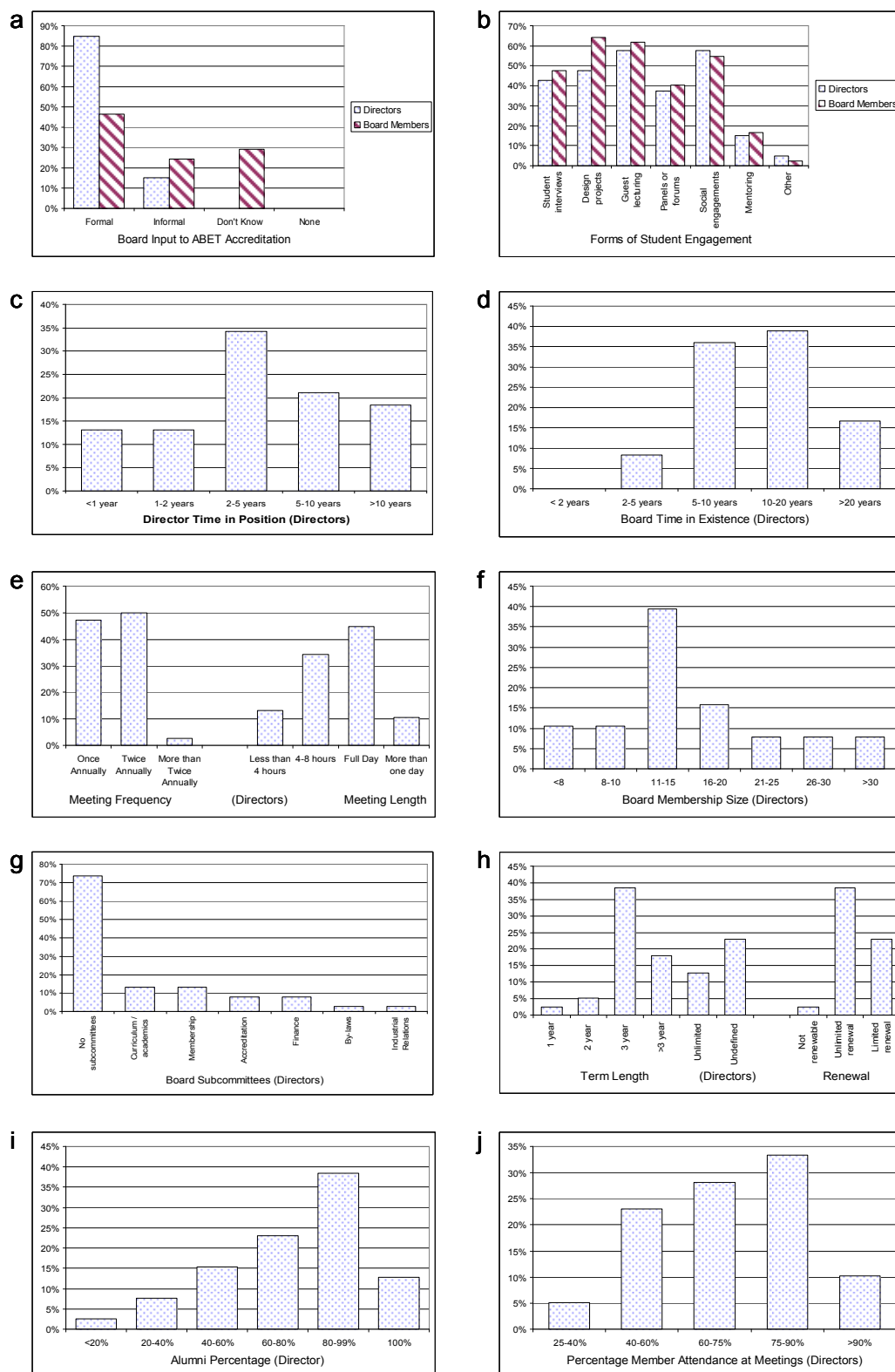


Figure 6.19. Survey responses, board structure and operation.

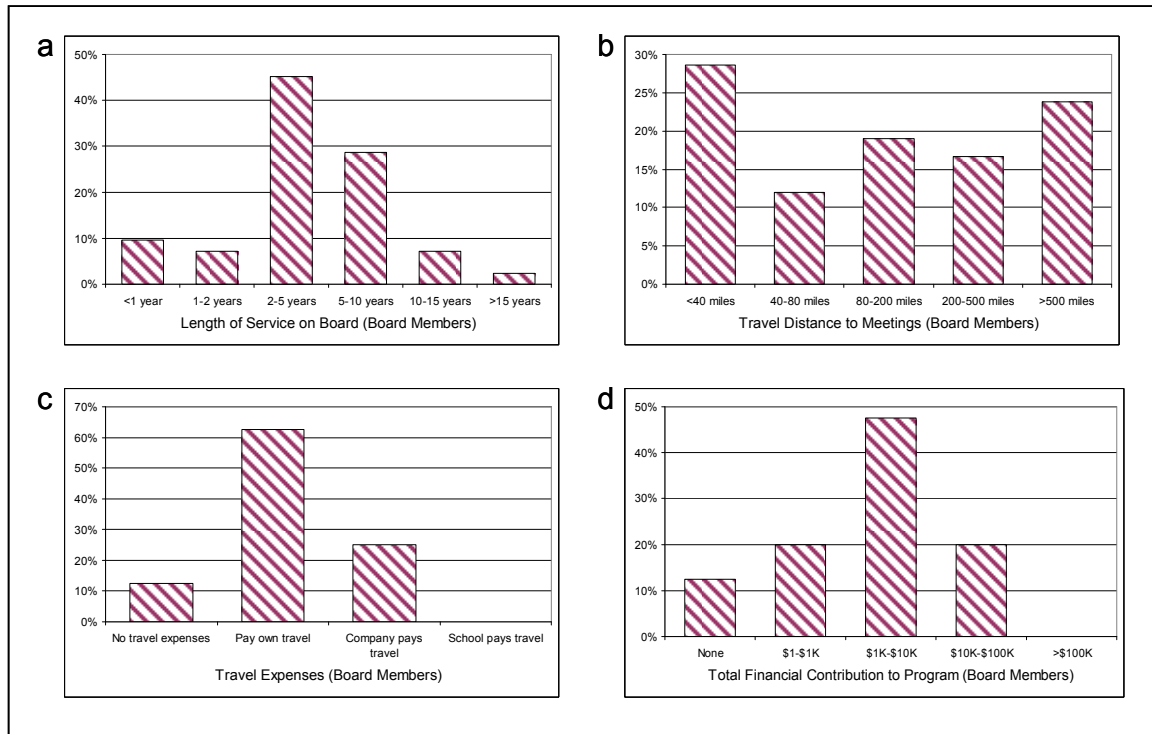


Figure 6.20. Survey responses, board member information.

In general, analysis in this section examines how measures of effectiveness explored in research question two (individual model outputs) are influenced by factors of board operation. If the independent variable is interval in nature (usually the result of a 1 to 5 response), a correlation study is generally performed. If the independent variable is categorical, then a one-way analysis of variance (ANOVA) is typically used. Depending on the independent variable being studied, the dependent variable is generally one of the effectiveness measures (outputs) of the appropriate effectiveness model, or overall program effectiveness. This section is organized, as the previous section was, by effectiveness model element.

6.5.1 Human Relations Variables

The Human Relations model focuses on the interpersonal relationships of the board, with the output being how the board members feel about their personal involvement and working relationships. Questions in this area explore how different elements of board operation affect the interpersonal dynamics of the board.

All survey respondents were asked in survey section 7.1 to indicate their degree of agreement with the statement: *“Efforts are made to encourage socialization among board members and faculty.”* Response was on a 1 to 5 interval scale, with a 1 indicating strong disagreement and a 5 strong agreement. The mean response to this question was 4.23 (Figure 6.18a) with very little difference between director and member response. This response correlates positively but weakly with “Working relationships” ($r = 0.16, p = .021$). It correlates very strongly with “Faculty engaged” ($r = 0.59, p < .001$), which was the strongest Human Relations measure in terms of correlation with overall effectiveness. The inference is that most programs do intentionally set out to provide opportunities for socialization among board members and with faculty and that this is a strong influence on effectiveness in the Human Relations area, particularly in terms of faculty engagement.

Board members were asked in survey section 9.1 to what extent they agreed with the statement: *“I attend all of the advisory board meetings”*, with the usual 1 to 5 interval response. The mean response was 4.31 (Figure 6.18e). There is a clear correlation between their response to this question and the response to the “Time well spent” assessment from research question two ($r = .47, p = .002$). There is also positive correlation, as might be expected, between this question about board member attendance

and the “Enjoy participation” assessment from research question two ($r = .47$, $p = .002$).

This would seem like a fairly obvious conclusion; board members who feel that their time is well spent at meetings and enjoy their participation are more likely to consistently attend meetings. From research question two, board members who believed their time was well spent and enjoyed participation were much more likely to consider their boards as effective overall, so looking at member attendance can give some insight into issues with Human Relations and overall effectiveness from the board member perspective.

When directors were asked to estimate the typical percentage of board member attendance at board meetings, the data in Figure 6.19j resulted. The attendance at board meetings varies widely, from less than 40% to more than 90% of board members typically present. In contrast to the perspective of board members, there does not seem to be a meaningful relationship between this measure of board member attendance and measures of Human Relations effectiveness or overall effectiveness. One possible explanation of this discrepancy is that department directors are taking into account the whole range of advisory board member participation in their response, while advisory board members who responded to the survey are, almost by definition, more engaged in the advisory board process and more likely to attend meetings than the advisory board population as a whole. Both directors and board members, however, commented on problems with board attendance as a concern for their programs in their survey responses. “Members who never attend meetings” was the complaint from one board member.

There is a wide range in board membership size, from less than eight members to more than twenty-five, as reported by directors in Figure 6.19f. One of the potential influences on interpersonal dynamics could be the size of the board, with the hypothesis

that working relationships would negatively correlate to the size of the board. An ANOVA looking at the effect of board size on working relationships ($F(6,31) = 0.38, p = 0.884$) shows that this hypothesis can be rejected, meaning that there does not appear to be any significant relationship between the size of the board and the working relationships on the board.

In summary, activities aimed at encouraging socialization within the advisory board program do seem to be worthwhile in creating a more effective Human Relations environment, and consistent board member attendance is a reflection of a positive Human Relations environment from the board member perspective. The size of the board does not seem to be a factor in influencing how effectively board members interact.

6.5.2 Internal Process Variables

Many of the survey questions asked of program directors regarding operation of their advisory board program fall under the Internal Process model, such as board structure, size, and meeting frequency.

Figure 6.19d shows how long advisory boards have been in existence at the responding programs, as reported by program directors. Most boards have been in existence between ten and twenty years, but a large number have been in existence for less than ten years. Boards formed within the last seven years commonly can trace their genesis to the introduction of the ABET 2000 accreditation process. There does not appear to be any correlation between the maturity of advisory board programs and any individual measure of effectiveness.

Figure 6.19g indicates that the majority of boards operate as a single body with no subcommittees and shows the types of subcommittees when they do exist. When

subcommittees do exist, the most common subcommittees deal with curriculum, membership, accreditation, and finances. There is no statistically significant difference in how well run a program is viewed ($F(1,37) = .15, p = .701$) or overall effectiveness ($F(1,37) = 1.35, p = .210$) depending on whether or not subcommittees are in place. .

Figure 6.19h shows what policies are in place regarding the term of service of advisory board members, as reported by program directors. Almost 40% of programs have an undefined or unlimited term of service. For those programs that do specify terms the most common length is three years and the term is renewable an unlimited number of times.

Program directors report that the modal board has between eleven and fifteen members (Figure 6.19f). Board size does not seem to have any significant effect on how well run a program is (“Well run”) ($F(6,31) = .71, p = .641$) or on overall effectiveness ($F(6,31) = .77, p = .596$). There is a strong inverse relationship, however, between the size of the board and the percentage of board members who attend meetings as reported by directors ($F(6,31) = 2.98, p = .020$, Figure 6.21). This is a logical connection in that board members who are a part of large boards may tend to feel that their presence is not that important to board operation.

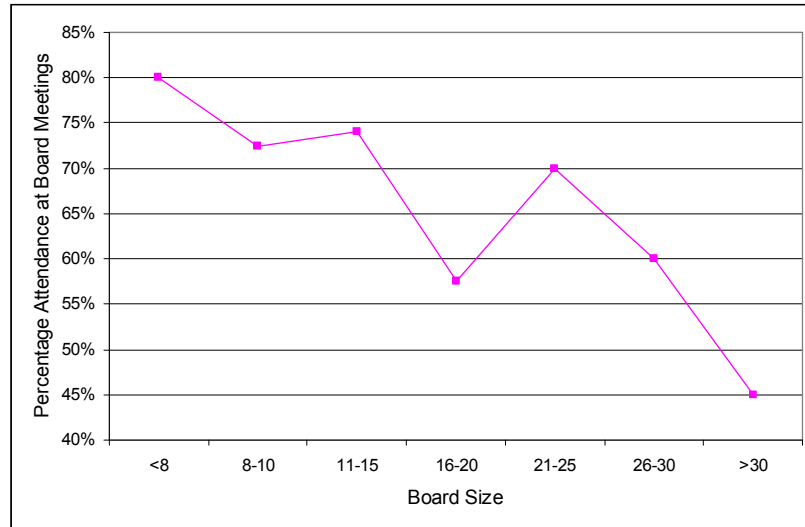


Figure 6.21. Board size versus percentage board attendance.

Directors were also asked how often their boards met and how long the meetings lasted. The results are shown in Figure 6.19e. Multiplying the number of meetings per year by the meeting length (using 3, 6, 9 and 12 hours for each successive category) gives the total annual engagement time of the board in board meetings, shown in Figure 6.22. The mode is five to ten hours of engagement in board meetings per year. An ANOVA does show a significant effect of total engagement hours on overall board effectiveness ($F(5,32) = 3.06, p = .023$, Table 6.12), although no trend emerges from the analysis.

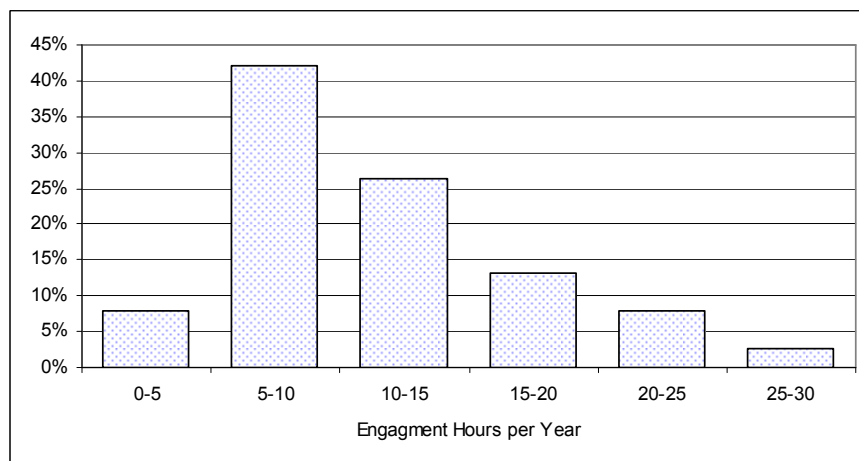


Figure 6.22. Survey, total annual engagement time in board meetings (directors).

Table 6.12. Annual engagement hours effect on overall effectiveness.

Hours	N	Mean	StDev	Individual 95% CIs For Mean
0-5	3	3.6667	0.5774	(-----*-----)
5-10	16	4.3750	0.5000	(---*--)
10-15	10	3.9000	0.5676	(----*----)
15-20	5	3.6000	0.5477	(-----*-----)
20-25	3	4.3333	0.5774	(-----*-----)
25-30	1	5.0000	*	(-----*-----)
				-----+-----+-----+-----+-----
				3.20 4.00 4.80 5.60
				Overall effectiveness

Figure 6.19c shows how long department directors have been in their role as program head, with the typical director having been in their position for two to five years. When the effects of time in position are tested against overall effectiveness, a trend does emerge (Figure 6.23) that directors with more experience have more effective programs, although it cannot be stated to be statistically significant ($F(4,33) = 1.87, p = .140$). A similar pattern emerges when director experience is examined against the “Department director effective” assessment (Figure 6.5) from research question two ($F(4,3) = 2.08, p = .106$, Figure 6.23).

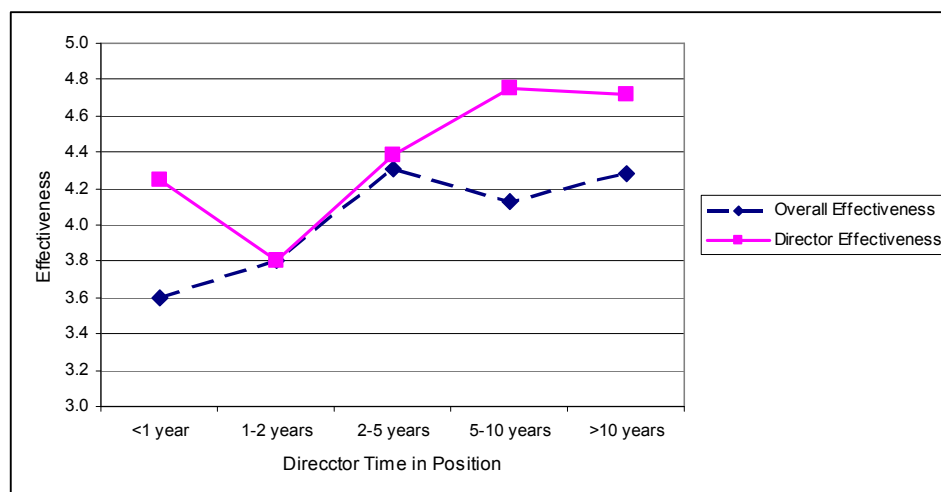


Figure 6.23. Survey, department director length of time in position (directors).

Department directors were also asked to what extent they agreed with the statement: *“I feel comfortable in my role coordinating the work of the advisory board”*. The results are shown in Figure 6.18d, indicating that most directors feel quite comfortable in their relationship with the board (mean response 4.41). When this response is evaluated considering years of director experience, no significant effect is seen ($F(4,32)=0.45, p = .769$). When a correlation is run comparing how comfortable directors are in their role with their assessment in research question two of how effective they are in the role (Figure 6.5), there is a positive but statistically weak correlation ($r = 0.23, p = 0.185$).

Several directors expressed concern that board members were not involved with programs between board meetings. A typical comment is, “During the full day of the meeting, they are 100% committed to us, but sometimes projects they commit to lose their high priority when the meeting is over.” When board members were asked how involved they were in their program outside of board meetings, the responses in Figure 6.18f resulted. There is a wide range of involvement indicated, and many board members do not stay involved with the program to any extent between meetings. However, even though directors raise this as a concern for programs, the level of involvement between meetings does not show a significant correlation with program assistance (Figure 6.6) ($r = -0.17, p = .305$) or to overall effectiveness ($r = 0.20, p = .195$).

Board members were asked to indicate their agreement with the statement, *“The board is given candid and complete information regarding the state of the educational program”*, and the usual 1 to 5 interval response is seen in Figure 6.18i. Board members

generally feel good about the level of communication and information they are getting from the school (mean response 4.50). This variable shows positive correlation against the measure of “well run” for internal process effectiveness ($r = 0.33, p = .033$) and against overall effectiveness ($r = 0.41, p = .007$). Open and honest communication is a key ingredient for an effective board relationship in the view of board members.

Comments from board members on the strengths of their program support this: “Open discussion and evaluation of the program and the staff”, and “Free exchange of ideas and openness of discussion.”

Board members were also asked to indicate their agreement with the statement, “*The school follows up on actions from advisory board meetings*” (Figure 6.18j). The response was positive, but not as strongly positive as the question regarding communication (mode moves from five to four). This, too, showed a strong correlation to how well run the board is viewed by board members ($r = 0.35, p = .022$) and to overall effectiveness ($r = 0.44, p = .004$). Interviews with board members indicate that they quickly get frustrated if actions taken in board meetings are not consistently acted upon by the school.

This section has presented data on the history, structure, and operating characteristics of boards, and little statistical impact on overall board effectiveness is seen from any of these variables. There is a general trend that directors with more experience are more effective but this effect is not statistically significant. The one clear relationship that does emerge is that larger boards tend to have a lower percentage of average attendance at board meetings although this does not appear to have an impact on overall effectiveness. Open communication and consistent follow through on actions from the

advisory board are seen as essential to board effectiveness from the board member perspective.

6.5.3 Rational Goal Variables

The advisory board objectives that are part of the Rational Goal model are curriculum input, ABET accreditation, program support, and internal fundraising. These are goals that the board can accomplish through internal planning, effort, and resources. In this section, characteristics of board operation that might directly affect these objectives are explored.

ABET accreditation is a very important objective for advisory boards and has a strong correlation to overall effectiveness as viewed by directors. Both directors and board members were asked whether the board's input in the accreditation process was best characterized as formal, informal, none, or unknown. Figure 6.19a shows the responses. Though all respondents indicated that the board played some role in ABET accreditation, almost 30% of board members did not know how their input was used. An ANOVA looking at the effect of ABET input structure on the effectiveness of the ABET accreditation objective shows a significant effect ($F(2,76) = 21.63, p < .001$) which is illustrated in Figure 6.24. Clearly, programs that have a formal process by which board input is used in the accreditation process are viewed as most effective as far as the accreditation process is concerned, and programs in which the board members are unclear about their input are the least effective.

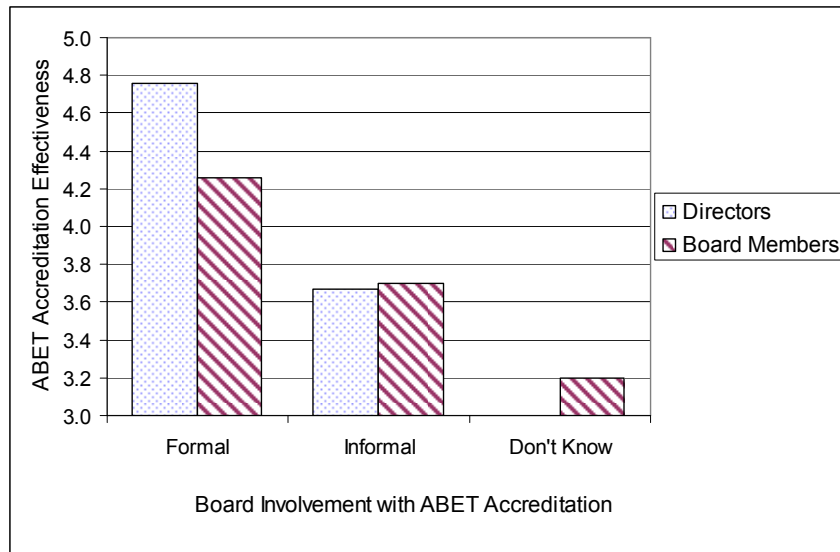


Figure 6.24. ABET input structure versus ABET accreditation effectiveness.

To further explore how board members interact with the educational program, both directors and board members were asked to indicate various ways that board members were engaged with students. Figure 6.19b lists different types of board engagement and the percentages of programs that were involved in each type on an ongoing basis. To assist with analysis, a “student engagement index” was created that simply counted the number of types of engagement listed from each respondent. A high student engagement index indicates that the board is engaged with students in many different ways. A correlation of student engagement index with overall effectiveness was run for both directors and members. It shows that from the board member perspective, programs that are more engaged with students are viewed as more effective overall ($r = .32, p = .037$). However, there is no similar correlation from the director perspective ($r = -0.26, p = .105$). This relationship to overall effectiveness is shown graphically in Figure 6.25. Indications are that the more that board members feel that they are engaging with and directly helping students, the more effective they view the advisory board program.

Directors, however, do not show this same correlation to overall effectiveness, and it would appear that they do not see board member engagement with students as important as board members do. This is consistent with the finding from research question two that program assistance, which includes student engagement, shows a strong correlation to overall effectiveness by board members but not by directors.

To further explore this area of student engagement each of the six individual types of student engagement was examined to see if it correlated to overall effectiveness. A series of one-way ANOVAs was run comparing the overall effectiveness of a program in the presence or absence of each type of student engagement. Only board engagement in panels or forums shows a statistically significant effect ($F(1,80) = 5.22, p = .025$), and Figure 6.26 shows that effect graphically, broken out by director and board member. The conclusion is that the use of advisory boards in panels or forums with students is the most valuable type of student engagement as far as overall board effectiveness is concerned.

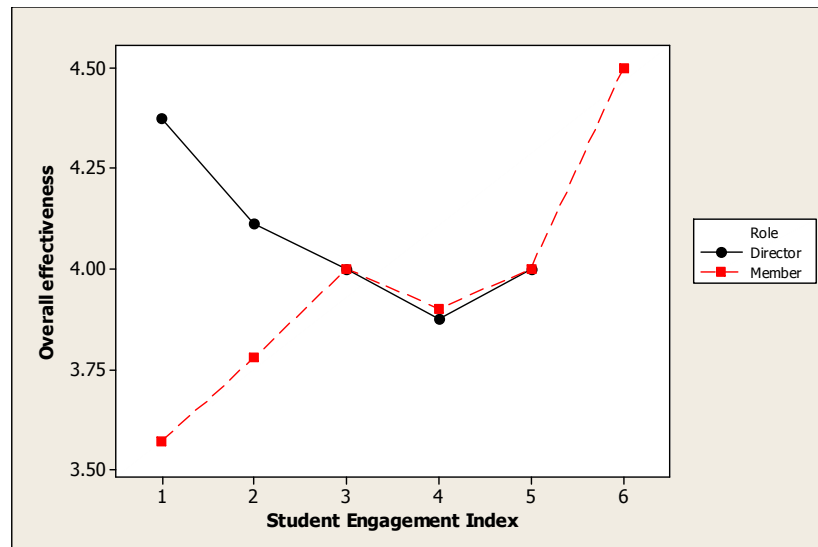


Figure 6.25. Student engagement index versus overall effectiveness.

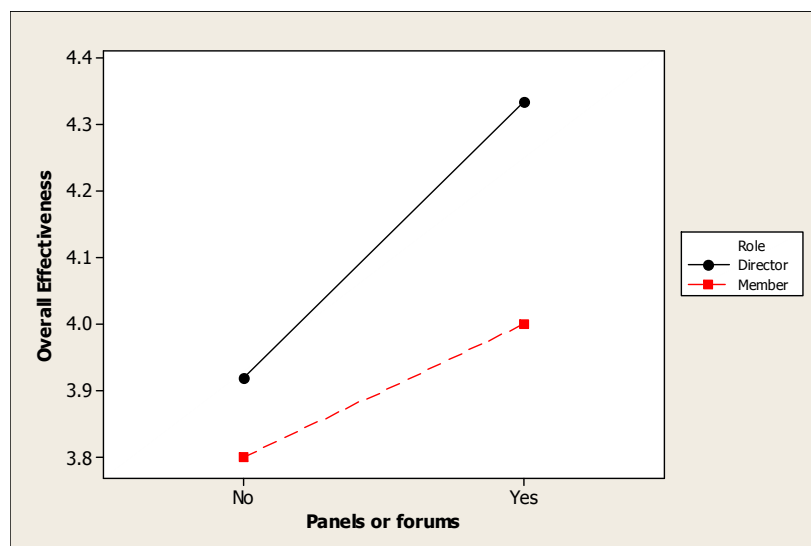


Figure 6.26. Use of panels or forums versus overall effectiveness.

Board members were asked to indicate their agreement with the statement, “*The program is clear and upfront regarding expectations about financial contribution from board members*”, with responses in the usual 5 point scale shown in Figure 6.18g. Board members show a wide range of responses to this question, as has been the case before in issues regarding fundraising. A correlation of this variable with the measure of internal fundraising effectiveness from research question two shows a strong positive relationship ($r = .38, p = .041$). This is consistent with earlier observations indicating the importance of having clear expectations and agreement between the school and the board on the place and priority of fundraising. Board members were also asked how comfortable they were with the priority and attention given to fundraising, and their responses are shown in Figure 6.18h. Once again, there was a wide range of responses indicating varying levels of comfort and discomfort with the role of the board in fundraising. This variable also shows a strong correlation to overall effectiveness ($r = .42, p = .017$), reinforcing how

important it is that board members “buy in” and align with the fundraising strategy of the board, whatever that might be.

The total amount contributed to engineering programs by each advisory board member respondent is shown in Figure 6.20d. The question specifically asked for the amount contributed to the specific engineering program, not the college or institution as a whole. The typical advisory board member has contributed between \$1000 and \$10,000 to the engineering program with which he or she are involved, although just over 10% of board members have made no financial contribution. An ANOVA of the effect of individual contribution amount on the assessment of internal fundraising effectiveness does not quite reach statistical significance ($F(3,29) = 2.76, p = .060$), but there is a strong effect on the *importance* of internal fundraising ($F(2,35) = 5.09, p = .005$). Both relationships are shown in Figure 6.27. Board members who do not contribute to the program can still feel that the board is effective in this area, either because they are aware of others who contribute, or more likely because their school has made a deliberate decision not to involve the board in fundraising. On the other hand, board members who do feel that fundraising is an important priority for the board are likely to give significantly more to the engineering program.

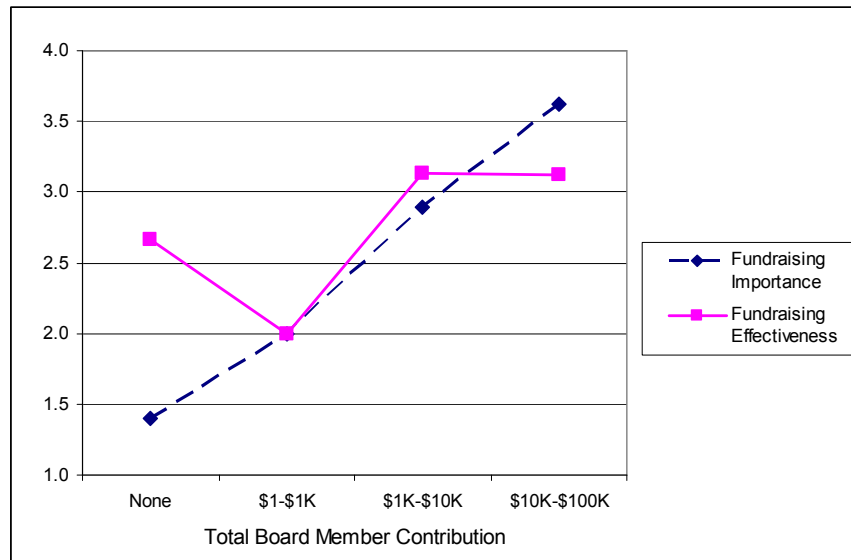


Figure 6.27. Fundraising effectiveness and importance versus board member contribution.

This section has identified some of the variables that control the effectiveness of Rational Goal objectives. Creating formal procedures for involvement of the board in ABET accreditation and making sure that board members are aware of those procedures drive effectiveness in this area. Encouraging and facilitating board engagement with students, particularly through their involvement in panels or forums, improves overall effectiveness, particularly in the view of board members. When it comes to internal fundraising, clear and aligned expectations between the program and its board members are essential so that members are comfortable with the strategy, whatever it might be. For those boards that do choose to involve the board in fundraising, the more that board members agree that fundraising is a priority the greater their level of contribution.

6.5.4 Open Systems Variables

The Open Systems model deals with interactions between the board and the surrounding educational and societal environment and includes the objectives of health

and development, program advocacy, external fundraising, and research support. The only operating variable that showed an effect in this area was the degree to which advisory board activity was coordinated with the overall program of the institution. A director noted that, “In the past, the development role had not been coordinated with the College of Engineering. College of Engineering interface has never been a major element of the (school) board.” A member expressed frustration that, “University rules ... limit how many of the board’s recommendations can be implemented.” Directors and board members were asked to indicate their agreement with the statement: *“Operation of this advisory board is well coordinated with the rest of the college or university”*, and the response is shown in Figure 6.18c. This variable shows a strong correlation to overall effectiveness ($r = .33, p = .004$), to external fundraising effectiveness ($r = .34, p = .005$), and to research ($r = .49, p < .001$). The implication is that the advisory board should not be allowed to be an isolated “island” (with visibility and communication only within the particular engineering program) and effort should be made to engage and coordinate the advisory board with the larger program of the college of engineering and university. This will pay off in increased effectiveness in several important areas, even if it does require more time and effort on the part of the program. Larger fund raising and research projects are typically beyond the scope and leadership of a single advisory board, though the board can play an important role in supporting these efforts with appropriate coordination.

6.5.5 Conclusions, Research Question Three

There are clearly identified variables that have a direct impact on the output of each of the four effectiveness model areas and thus on overall effectiveness. Based on

the survey results and analysis in this section, advisory board program leaders would do well to keep in mind the following:

- Encourage socialization between board members and with faculty.
- Ensure that the board receives candid and complete information regarding the educational program.
- Ensure that the school follows up on actions from advisory board meetings.
- Establish and communicate formal procedures for board input into the ABET accreditation process.
- Encourage direct board member engagement with students, particularly in the form of panels or forums.
- Establish clear and aligned expectations regarding internal fundraising, regardless of what these expectations may be. Ensure that the board takes the initiative in whatever fundraising efforts are undertaken rather than being pressured by the school to contribute.
- Make efforts to coordinate advisory board activity with the rest of the college or university.

6.6 MEMBER SELECTION - Research Question Four

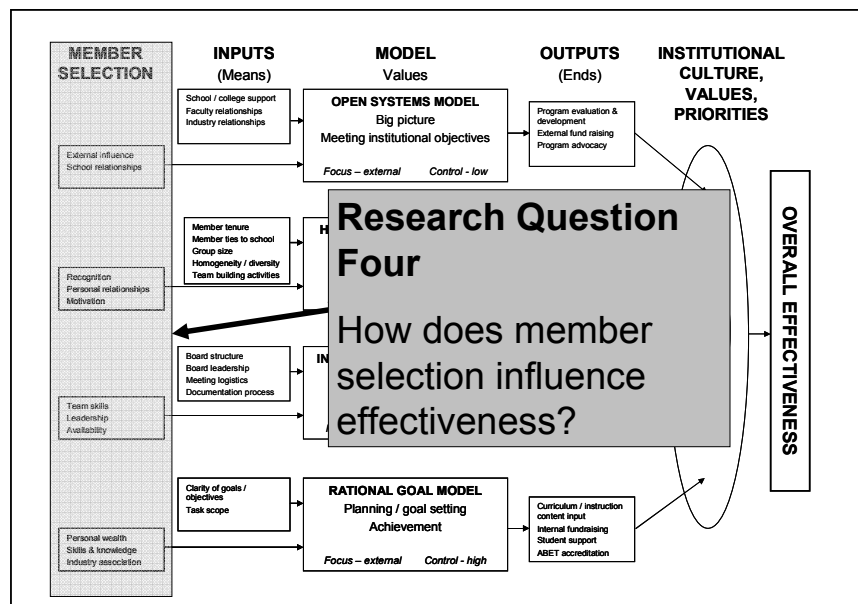


Figure 6.28. Research question four mapping to overall effectiveness model.

Research question four asks, “How does board member selection influence effectiveness?” Figure 6.28 illustrates the relationship of this question to the overall

effectiveness model. This question deals with inputs to the effectiveness elements that are specifically associated with the composition of the board and selection of board members. The section starts with a broad look at the response to a series of survey questions regarding board member selection priorities and examines board membership as it affects each effectiveness model element.

6.6.1 Survey Questions and Responses Regarding Member Selection

Characteristics

The heart of the analysis of membership characteristics of advisory boards involves a series of thirteen questions (Table 6.13) that were asked (survey section 7.5 and 7.6) of both directors and board members regarding board member selection. Respondents were first asked to indicate how important each of the listed characteristics were in selecting a board member, using a 1 to 5 scale where a 1 was “completely unimportant” and a 5 was “extremely important”. The respondents were then presented with the same set of characteristics and asked to indicate how well the board composition aligned with their indicated priorities. Responses were again on a 1 to 5 scale, with a 1 being “completely unsuccessful” and a 5 being “completely successful”. A “don’t know” option was also given for this second series of questions.

Table 6.13. Survey questions regarding board member selection characteristics.

Survey Question	Title
<i>Personality and "fit with director, faculty and present board members</i>	Personality and fit
<i>Personally known and recommended by faculty or other board members</i>	Personally known
<i>Strong desire to be involved with and support the program</i>	Desire to be involved
<i>Close ties and ongoing relationship with the school</i>	Close ties to school
<i>Recognition for past contribution to the school</i>	Recognition
<i>Brings leadership or other needed skills for internal board operation</i>	Brings skills
<i>Work experience or expertise in a relevant engineering or educational field</i>	Relevant experience
<i>Association with a company that is a potential employer of program graduates</i>	Potential employer
<i>Senior leadership status and influence in industry, government, etc.</i>	Status and influence
<i>Promote relationship with a strategic company, government or other organization</i>	Strategic relationships
<i>Individual net worth</i>	Net worth
<i>Availability (time, proximity to school, etc.)</i>	Availability
<i>Diversity (industry, age, gender, race, etc.) to help round out the board</i>	Brings diversity

Figure 6.29 shows the mean response of directors and board members to each of the questions regarding member characteristics in terms of importance and actual composition of the board. Figures 6.30 and 6.31 show an analysis of the mean response of directors and board members respectively regarding the importance of each of the member selection characteristics, compared with the overall mean of all responses. This analysis shows whether the importance of each characteristic is statistically higher, lower, or the same as the average importance of all characteristics. Directors and members alike view a desire to be involved and relevant work experience as the most important characteristics for board members (4.51 and 4.44 respectively). They also agree that individual net worth and the desire to recognize past contributions to the school are the least important reasons to invite an individual into board membership (2.00 and 2.56).

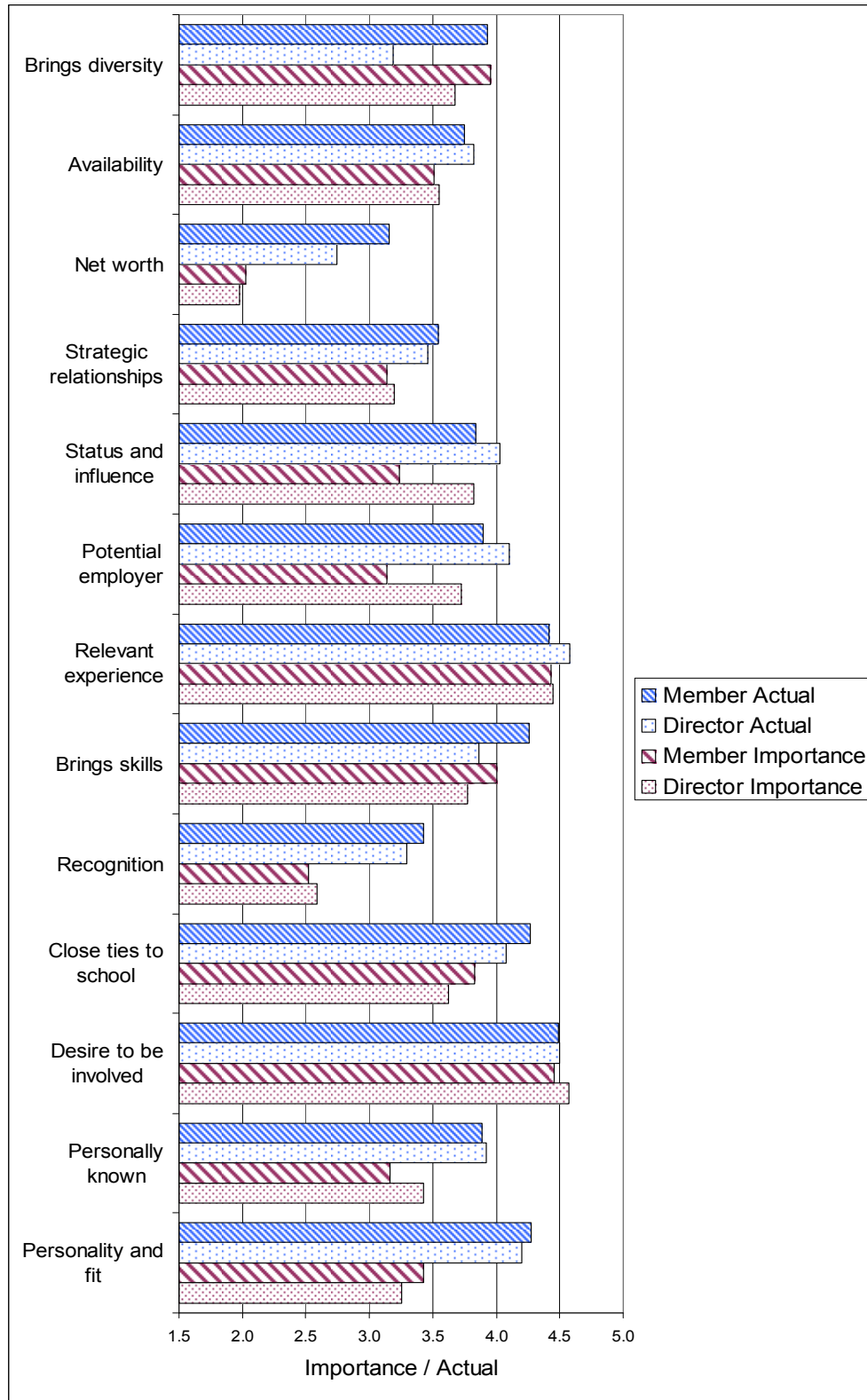


Figure 6.29. Membership characteristics, importance and actual representation.

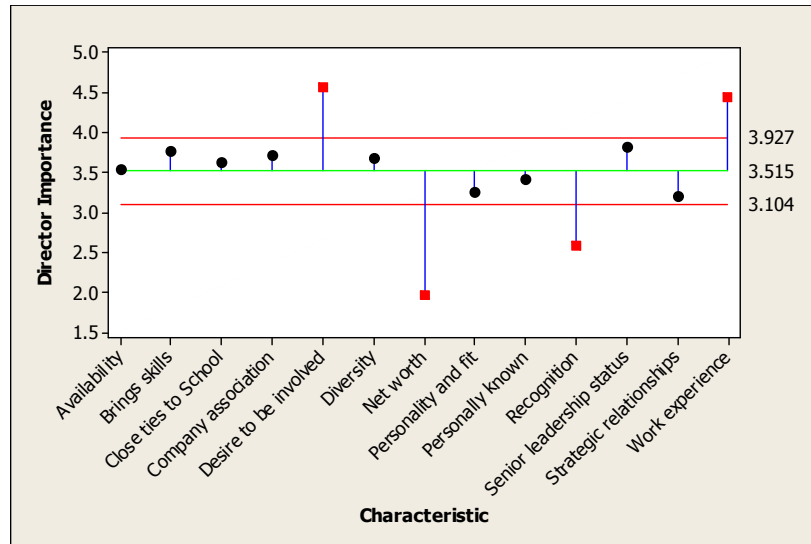


Figure 6.30. Analysis of Means, member selection characteristic importance (directors).

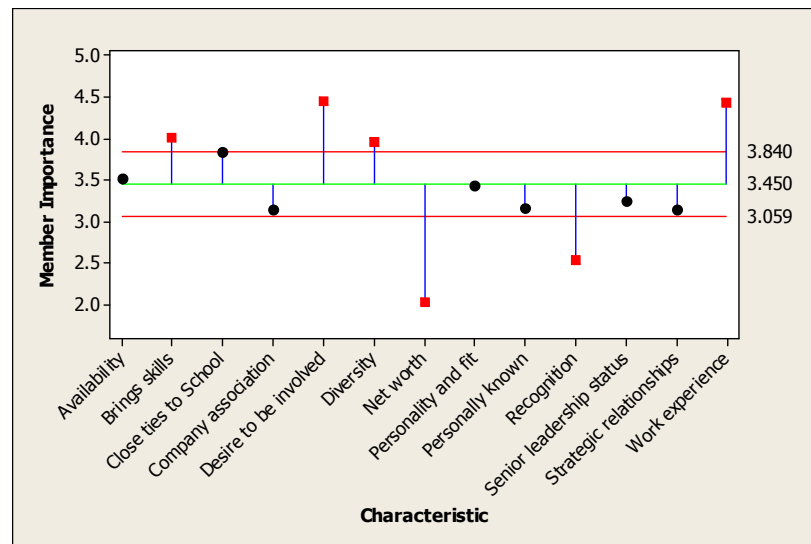


Figure 6.31. Analysis of Means, member selection characteristic importance (board members).

Figure 6.32 shows the difference in responses between actual representation and desired representation (importance) of different characteristics of board members. A positive number implies that the respondent is satisfied with board representation for the particular characteristic (actual representation is greater than importance). A negative

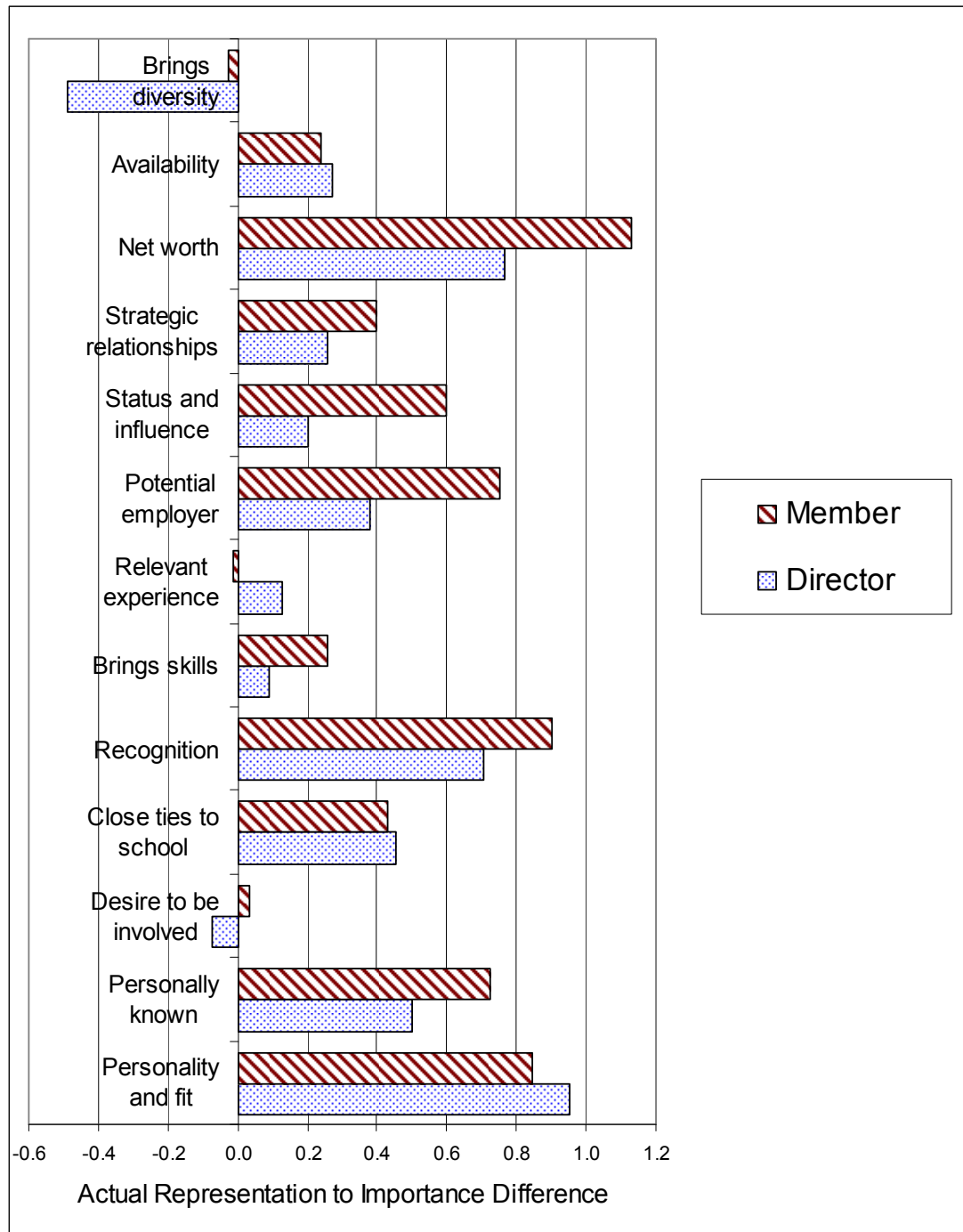


Figure 6.32. Membership characteristics, actual representation to importance difference.

number on this chart implies that there is a “gap” in board composition in this area. Note that the only statistically significant shortfall in board representation that shows up in the

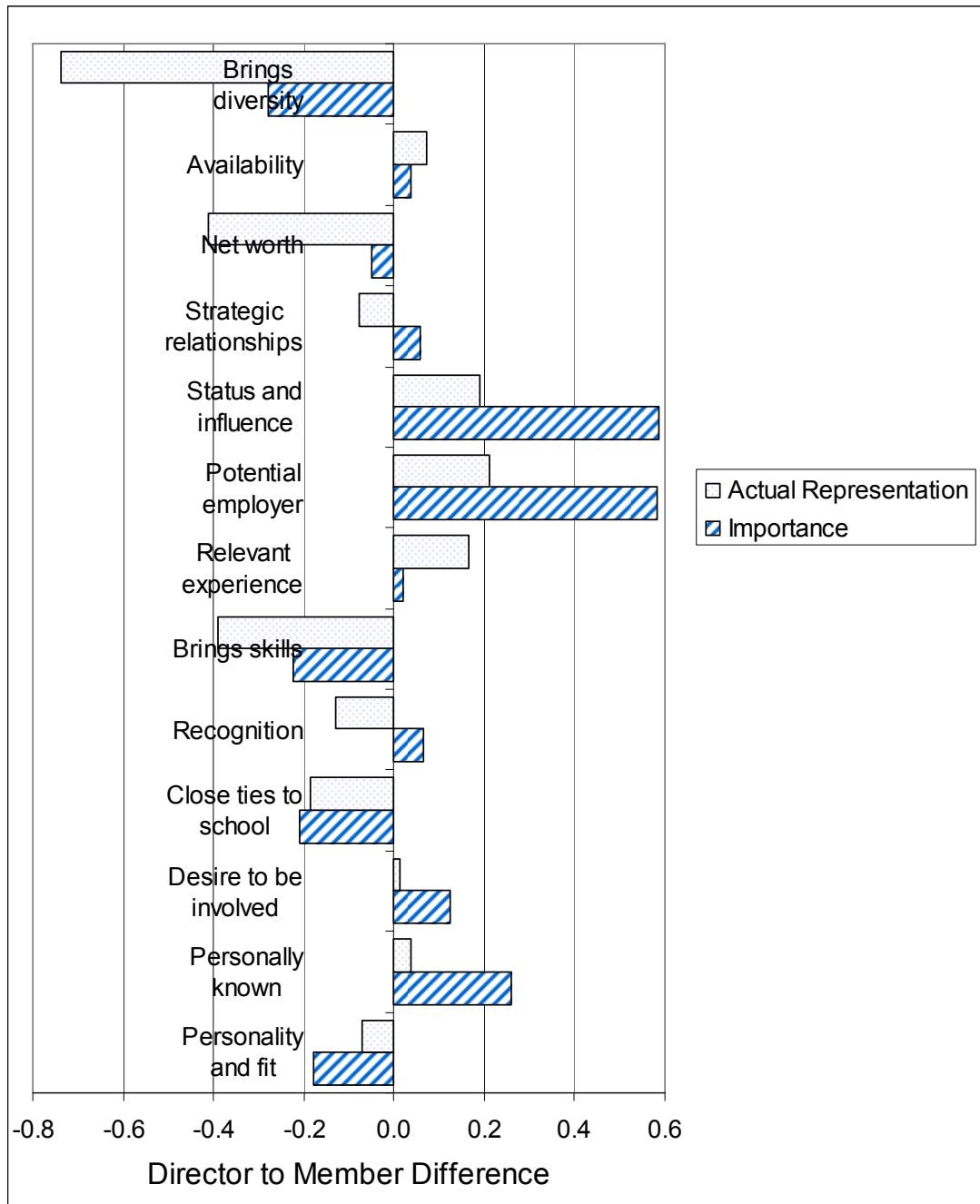


Figure 6.33. Membership characteristics, director to member differences.

survey is a concern about adequate diversity on the board, expressed by program directors. Figure 6.33 shows the difference in response between members and directors for importance and actual representation of membership characteristics. A positive

number in this representation implies that program directors put more emphasis on this characteristic than do board members (importance) or feel the board has greater representation of this characteristic than do board members (actual). Note that the scale on this graph amplifies the differences compared with Figure 6.32. There are three areas in which there are significant differences between director and member assessment of board composition. Directors feel that the status and influence of board members and their potential as future employers of graduates are more important than do board members. Board members feel that the board is more strongly represented in terms of diversity than do program directors.

In another series of questions, board members were asked to provide personal demographic and participation information that would be helpful in understanding the composition of their advisory board. In survey section ten, questions were asked regarding age, gender, minority status, education, career, net worth, alumni status, and ties to the school of board members. The responses are summarized in Figure 6.34. The typical advisory board member is approximately fifty-five years old, a white male with significant education, a graduate of the program on whose advisory board he is serving, a senior manager or executive in a manufacturing company, and has a net worth of approximately \$1 million.

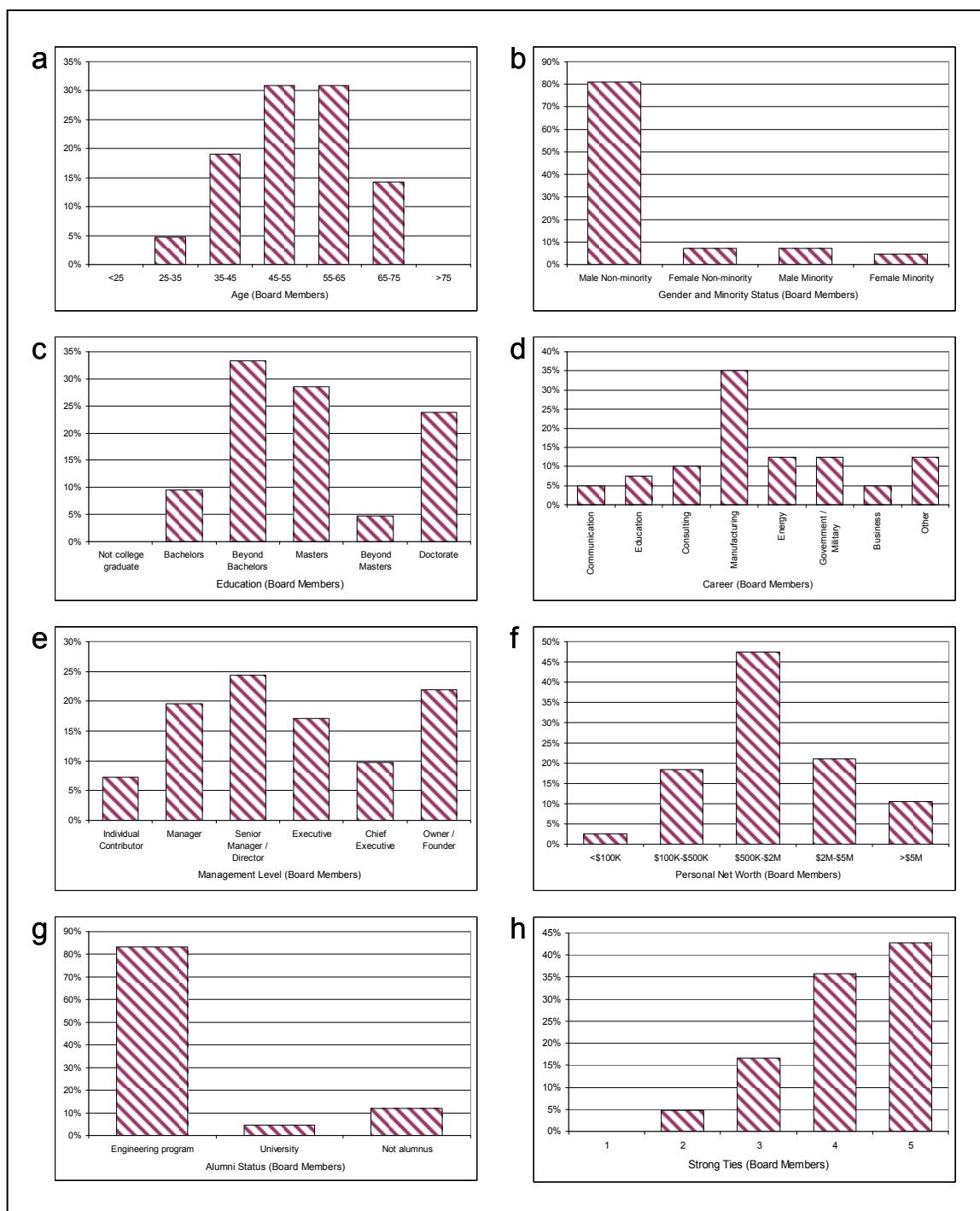


Figure 6.34. Survey response, board member demographics.

6.6.2 Member Selection, Human Relations Variables

The selection of board members has a large impact on the Human Relations aspects of an advisory board, i.e. how members feel about their personal involvement on the board and the working relationships within the board. The first course of analysis consisted of looking at the correlation between the response to each of the questions regarding actual board composition and each of the key output measures of the Human Relations model. The results are shown in Table 6.14, where correlations greater than .35 are highlighted. (The .34 correlation of “Brings Skills” to “Time well spent” is also highlighted as it was statistically significant.) It can be seen that there are several member selection characteristics that correlate strongly with Human Relations effectiveness, particularly as expressed in the degree to which board members enjoy and look forward to their participation.

Table 6.14. Correlations of board composition to Human Relations factors.

Selection Criteria	Human Relations Model Elements					
	Working relationships (all respondents)		Time well spent (board members)		Enjoy participation (board members)	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
Personality and fit	0.39	0.000	0.20	0.215	0.45	0.004
Personally known	0.28	0.014	0.17	0.319	0.32	0.054
Desire to be involved	0.21	0.062	0.44	0.005	0.60	0.000
Close ties to school	0.24	0.038	0.32	0.053	0.48	0.002
Recognition	0.14	0.250	0.22	0.217	0.23	0.203
Brings skills	0.19	0.105	0.34	0.033	0.46	0.003
Relevant experience	0.35	0.001	0.50	0.001	0.64	0.000
Potential employer	0.26	0.026	0.39	0.015	0.36	0.028
Status and influence	0.10	0.393	0.02	0.899	-0.03	0.840
Strategic relationships	-0.07	0.531	-0.16	0.335	-0.13	0.437
Net worth	-0.14	0.270	-0.22	0.279	-0.16	0.443
Availability	0.16	0.158	0.27	0.095	0.30	0.059
Brings diversity	0.13	0.269	0.17	0.299	0.36	0.021

The strongest and broadest correlation to Human Relations effectiveness comes from relevant work experience. This is the only characteristic which correlates significantly to all three elements of Human Relations effectiveness. Directors and board members also ranked this as one of the most important characteristics for member selection (Figures 6.30 and 6.31). Clearly, it is essential for board effectiveness that a high proportion of board members have careers that are directly relevant to the program with which they are associated. It is likely that this creates ties of common interest not only with the program but between members who have similar career experiences to share. Board member association with a company that is a potential employer of students also shows as a positive correlation, though not as strong. From the perspective of Human Relations, this is likely another way of saying that the board member is involved in a career that has direct relevance to the program and its graduates.

Also showing a strong correlation to Human Relations effectiveness is the desire on the part of a board member to be involved with the program. Directors and board members alike believe this is a top priority in the selection of a board member (Figure 6.30 and 6.31). This is a logical relationship, as board members with a strong desire for involvement are likely to participate in the program with greater consistency and enthusiasm and will feel better about their involvement. “Personal commitment and sincere concern for the program” and “a desire to help” are cited by board members as strengths of their advisory boards. Those who participate because they were assigned as a company representative or out of a sense of duty are much less likely to actively contribute to a positive working environment.

Board members with strong ties to the school are more likely to personally enjoy their participation with the advisory board program, as the positive correlation in Table 6.14 confirms. There is a strong correlation between the strength of the ties to the school as expressed in demographic information provided by board members (Figure 6.34h) and their assessment of overall effectiveness ($r = .60, p < .001$). This same assessment of strength of ties to the school correlates with key measures of Human Relations effectiveness - “Time well spent” ($r = .47, p = .002$) and “Enjoy participation” ($r = .50, p = .001$). In most cases it is likely that these ties are those of alumni who are remaining connected with or reconnecting with a program from which they graduated. A one way ANOVA assessing members’ response to “Time well spent” as a function of whether or not they are a program graduate shows a statistically significant effect ($F(1,40) = 4.84, p = .034$). ANOVAs of graduate status against “Working relationships” and “Enjoy participation” show a similar relationship, though not quite statistically significant ($p = .073$ and $.081$). These effects are seen graphically in Table 6.35, showing that program graduates have a more positive view of their participation in the advisory board than do non-alumni. (The 5.0 rating of “Enjoy Participation” is a single response.) Nothing in this research showed negative effects from having a high percentage of alumni on the advisory board, although concerns were voiced by one program director: “If too many alumni are on the board, it will be biased in favor of the department.”

Though it is not stated by directors or board members as being of high importance as a member selection characteristic, the “Personality and fit” of a board member does show positive correlation to Human Relations measures of working relationships on the

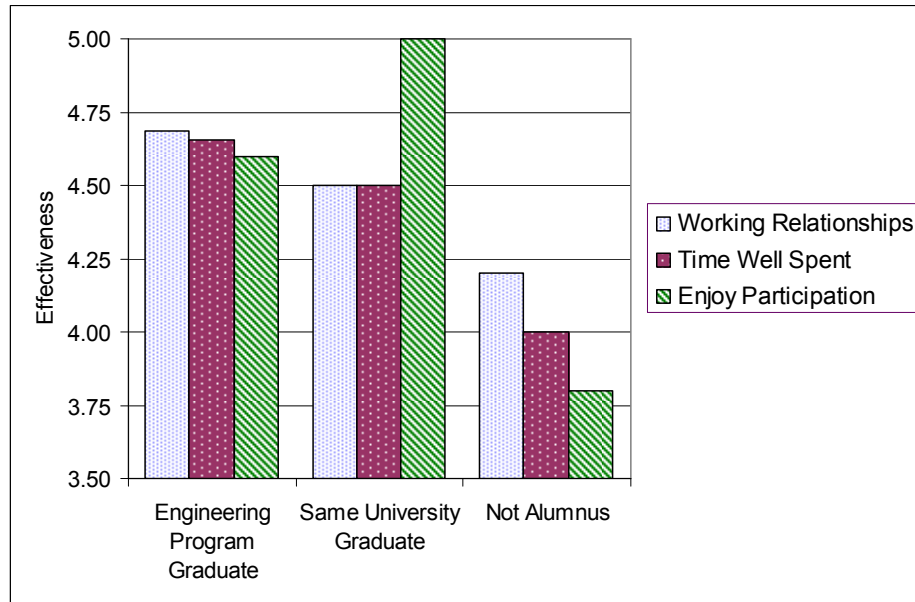


Figure 6.35. Alumni status versus Human Relations effectiveness.

board and the likelihood that the board member will enjoy the experience ($r = .39$ and $r = .45$). If a board member feels a lack of belonging or acceptance by the board, for cultural, career, personality, or other reasons, it is likely that that the board member will limit his or her involvement and become less effective. Some programs allow board members to attend a board meeting or two on a trial basis before extending a formal invitation to membership, perhaps to address this issue of “fit”.

The effectiveness of the program in bringing diverse membership to the board shows a positive correlation to “Enjoy participation” by board members ($r = .36$). When board members and directors were asked to evaluate the statement: *“There is a wide range of age, culture, background and industry experience represented on the board”*, the responses (Figure 6.18b) show a strong correlation to “Working relationships” ($r = .47$, $p = .002$) by board members. While diversity was very broadly defined in these questions, this does indicate that diversity, however it was interpreted by those answering

the survey, is important to Human Relations effectiveness. Board members place a higher importance on diversity than do program directors (board members 3.95, directors 3.68) but are comfortable with the level of diversity on the board (mean response 4.48). It would appear that board members must have in mind diversity other than race and gender, as over 80% of the membership of advisory boards are white males (Figure 6.34b). Program directors as a whole assess a significant gap in this area, desiring more diversity on their boards (Figure 6.32). Diversity is mentioned as a strength by one board member: “We have minorities, women, old, young, active, retired, semi-retired, academics from other engineering schools”, while a department director praises the “breadth and diversity of the board.”

In summary, the selection of board members can have a big effect on Human Relations factors of board effectiveness. To have effective working relationships on an advisory board, priority must be given to selecting members who have relevant work experience, who have a strong desire to be involved in the program, and who have close ties to the school. This will typically result in a high percentage of board members who are alumni of the school. Effective boards feel that they have broad and diverse representation in their membership, though diversity appears to be viewed more in terms of industry and career experience than of gender and culture. At the same time, diversity will have limits in order that board members maintain a sense of “fit” and are comfortable in the board environment.

6.6.3 Member Selection, Internal Process Variables

When each of the board member characteristic responses are correlated against the key Internal Process measures (clear objectives, well run, well documented, board

chair effective), it is clear that the selection of board members has less effect on the Internal Process operation of the board than it does on Human Relations factors. There is only one characteristic that emerges with a significant ($r > 0.35$) correlation in this analysis. “Brings skills” shows a positive correlation to “Well documented” ($r = 0.35, p = .002$). As this characteristic was described specifically in terms of bringing value to the internal processes of the board (*Brings leadership or other needed skills for internal board operation*), it is not surprising that it correlated with some measure of Internal Process effectiveness. It is not clear why there was correlation only to the documentation aspect of board operation.

One dimension of Internal Process effectiveness is consistent attendance of board members at board meetings. Survey responses were examined to determine which factors had the greatest effect on member attendance at meetings, as reported earlier by board members (Figure 6.18e). Not surprisingly, those board members who had the strongest ties to the school (Figure 6.34h) were the most likely to attend meetings consistently ($r = .36, p = .021$). There was a greater likelihood for alumni of the program to consistently attend meetings (mean response 4.40) than for non-alumni (mean response 3.86) but the effect was not statistically significant ($p = .158$). Surprisingly, there was essentially no effect on member attendance as a function of how far they had to travel to attend meetings ($F(4,37) = .68, p = .610$, Figure 6.20b). The conclusion here is that members who are positively motivated and have strong ties to the school will consistently attend meetings regardless of how far they have to travel.

6.6.4 Member Selection, Rational Goal Variables

When member selection characteristics were correlated with the Rational Goal objectives of the board, member selection does not appear to have any effect on the top priorities in this space (curriculum input and ABET accreditation) or on program assistance.

Membership characteristics do have a strong effect, however, on internal fundraising. There is a strong relationship between the effectiveness of the board in terms of internal fundraising and the percentage of board members who are alumni, as assessed by program directors (Figure 6.19i, $r = .42$, $p = .009$). This relationship is seen graphically in Figure 6.36. Figure 6.37 shows the contribution profiles of alumni and non-alumni board members, showing that program alumni are more likely to contribute larger amounts to the program.

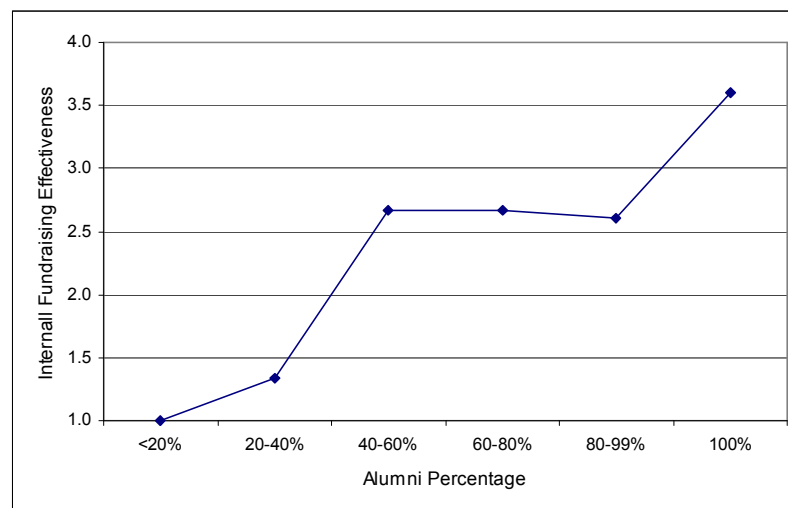


Figure 6.36. Internal fundraising effectiveness versus alumni percentage (directors).

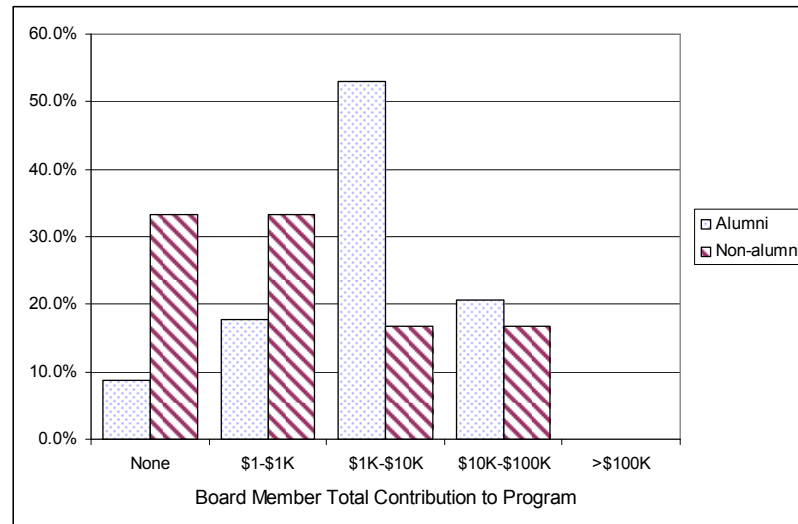


Figure 6.37. Alumni versus non-alumni contribution profile (board members).

Although net worth of board members is said by both directors and board members to be an unimportant consideration in the selection of board members (Figures 6.30 and 6.31), there is a positive correlation between the effectiveness of the board in internal fundraising and the composition of the board in terms of the net worth of members ($r = .36, p = .006$). It is significant to note, however, that 13% of the directors and 38% of the board member respondents indicated “don’t know” in evaluating board composition with respect to net worth, a higher percentage than for any other question in the survey. It would appear that directors are more conscious or aware of the net worth of members on the board than members themselves are. When the actual contribution level of board members (Figure 6.20d) is compared against their net worth (Figure 6.34f), a non-parametric ranked correlation (Spearman’s Rho) of .52 results, which shows a strong positive correlation. When the response of individual board members to the question regarding the *importance* of internal fundraising is compared with the self-reported net worth of the same board members, a strong effect is again seen ($F(4,32) =$

3.61, $p = .015$, Table 6.15). This effect would be even stronger if the single outlier response with a net worth of less than \$100,000 is removed. This response is associated with a young board member who, one could speculate, would like to be able to contribute significantly at some later point in his or her career.

Table 6.15. Net worth effect on importance of internal fundraising.

Net worth	N	Mean	StDev	Individual 95% CIs For Mean
<\$100K	1	5.000	*	(-----*-----)
\$100K-\$500K	7	2.143	1.069	(----*-----)
\$500K-\$2M	17	2.235	1.091	(---*---)
\$2M-\$5M	8	3.125	1.458	(-----*-----)
>\$5M	4	4.000	0.816	(-----*-----)
				1.6 3.2 4.8 6.4
				Importance of Internal Fundraising

If internal fundraising is a priority, these data suggest that alumni with higher net worth should be sought as board members as they are more likely to be supportive of this priority and to contribute more financially. As the accumulation of net worth is usually a function of time, it should come as no surprise that there is a strong correlation between net worth and age of board members (Figure 6.34a, $r = .63$, $p < .001$).

6.6.5 Member Selection, Open Systems Variables

When the set of questions regarding the actual composition of boards is evaluated against Open Systems model board objectives (health and development, advocacy, external fundraising, and research), none of the characteristics show a strong correlation ($r > .35$). When data regarding board demographics are examined, however, some trends do emerge.

There is a positive correlation between board members' response to the question regarding the strength of their ties to the school (Figure 6.34h) and the effectiveness of

the board in program advocacy ($r = .47, p = .002$). These data indicate that members who have close ties to the school are more likely to be active supporters of the program and use their influence to promote the school with future students, university administration, industry, etc.

As was the case with internal fundraising, the composition of the board in terms of net worth is positively correlated with external fundraising effectiveness ($r = .33, p = .011$). While external fundraising is not concerned with raising funds from board members personally, it is a logical assumption that board members with greater net worth are more likely to have relationships and be in positions to influence the contributions of others.

6.6.6 Conclusions, Research Question Four

Board member selection plays an important part in overall board effectiveness, particularly as far as Human Relations factors are concerned. The composition of the board has a strong effect on how board members relate to each other on the board and how they feel about their involvement. Here are some key considerations and conclusions in board member selection:

- Board members with close ties to the school are more likely to view their participation in the process positively, to attend meetings consistently, and to be advocates for the program.
- Board members with close ties will often be alumni of the program, and alumni are more likely to be financial contributors to the program. This research does not show any negative effects from having a high percentage of alumni on the board.
- Board members who have directly relevant work experience are more likely to have common ground with the program and other board members and view their participation positively.
- Board members should be chosen who have a strong desire to be involved with the program rather than being assigned by their company as a representative or talked into participation by program or board leadership.

- Consideration should be given to diversity and broad representation on the board, though not at the expense of selecting individuals who will be uncomfortable in the working environment of the board.
- If internal and external fundraising are priorities, individuals (particularly alumni) with higher net worth are likely be more supportive of the fundraising process.

CHAPTER 7: EFFECTIVENESS MODEL VALIDATION AND REFINEMENT

7.0 Summary

When the advisory board effectiveness model was initially formulated, there had been an extensive study of the literature but no direct data to confirm or validate its usefulness in helping understand advisory board effectiveness. One of the goals of this research was to validate and refine this model. This chapter shows how the research has validated the essential structure of the model and describes updates to the model based on the research data.

7.1 Model Validation

The conclusions of the case study and survey research validate the usefulness of the model as a framework to view the operation and effectiveness of advisory boards. The four model elements - Human Relations, Internal Process, Rational Goal and Open Systems - provide a logical and structured way to look at different aspects of board operation in terms of elements of overall effectiveness, operation of the board, and selection of board members.

All of the board activity discussed in the literature, seen during observation of board meetings, and discussed during interviews can be mapped into one of the four model areas. Working relationships within the board and the internal processes of the board (Human Relations and Internal Process models) create an operating foundation for the board. The eight identified board objectives are found either as outputs of the

Rational Goal model (objectives accomplished with internal board focus and resources) or of the Open Systems model (objectives accomplished with resources or interaction outside the board). No additional objectives were identified.

Outputs from each of the four model areas were seen as important elements of board effectiveness both in the case study and in the survey. In the case study, aspects of each of the four model area outputs were mentioned by those interviewed as being important components of effectiveness. In the analysis of the survey, measures or outputs from each model area were seen to correlate positively and significantly to overall effectiveness. This supports the model hypothesis that the truly effective board will be effective in each of the four model areas.

This research has also shown consistency with the view of effectiveness as a construct composed of elements at a lower level of abstraction rather than a single concept. The ideas of “program health”, “value added”, “open communication”, and “serious consideration” were all seen as different views of the overall effectiveness construct. Overall effectiveness was seen to be dependent on a number of elements at a lower level. The model theorized that different programs would differentially weight the elements that make up effectiveness depending on the culture, values, and priorities of the institution. This was seen to be the case, particularly as it regards the relationship of fundraising to overall effectiveness, where different programs had widely different views on the appropriateness and priority of fundraising as a board objective. Some programs placed significant emphasis on fundraising as a board priority while others deliberately kept the board out of this activity. Each approach was seen as effective by different boards.

7.2 Model Refinement

The study results suggest that the model does identify the major elements that make up effectiveness as seen by interview subjects and survey respondents. The data, however, have informed several refinements to the model, particularly with regard to the operating and member selection variables which are the inputs to each model area. The original model was described in Figure 3.1 and the model after refinements is shown in Figure 7.1. Aspects of the model that have changed are highlighted.

An aspect that was not represented in the initial model and was seen to be significant is that directors and board members often have different views of the construct of overall effectiveness. Board members, for instance, tend to place more emphasis on human relations and student engagement while directors tend to be more concerned with the mechanics of how the board operates, particularly in how it contributes to key department objectives such as accreditation. The updated model reflects this additional dynamic in the mapping of effectiveness elements into overall effectiveness.

When the model was originally created, there was relatively little understanding of which elements of board operation and member selection were significant in influencing effectiveness in each model area, so a wide range of broadly defined variables was considered as potential input factors for each model element. As the research continued with interviews and data from the survey, it became clear that the operational and member selection input variables as described in the original model, while helpful in formulating the original interview and survey questions, were not very helpful in

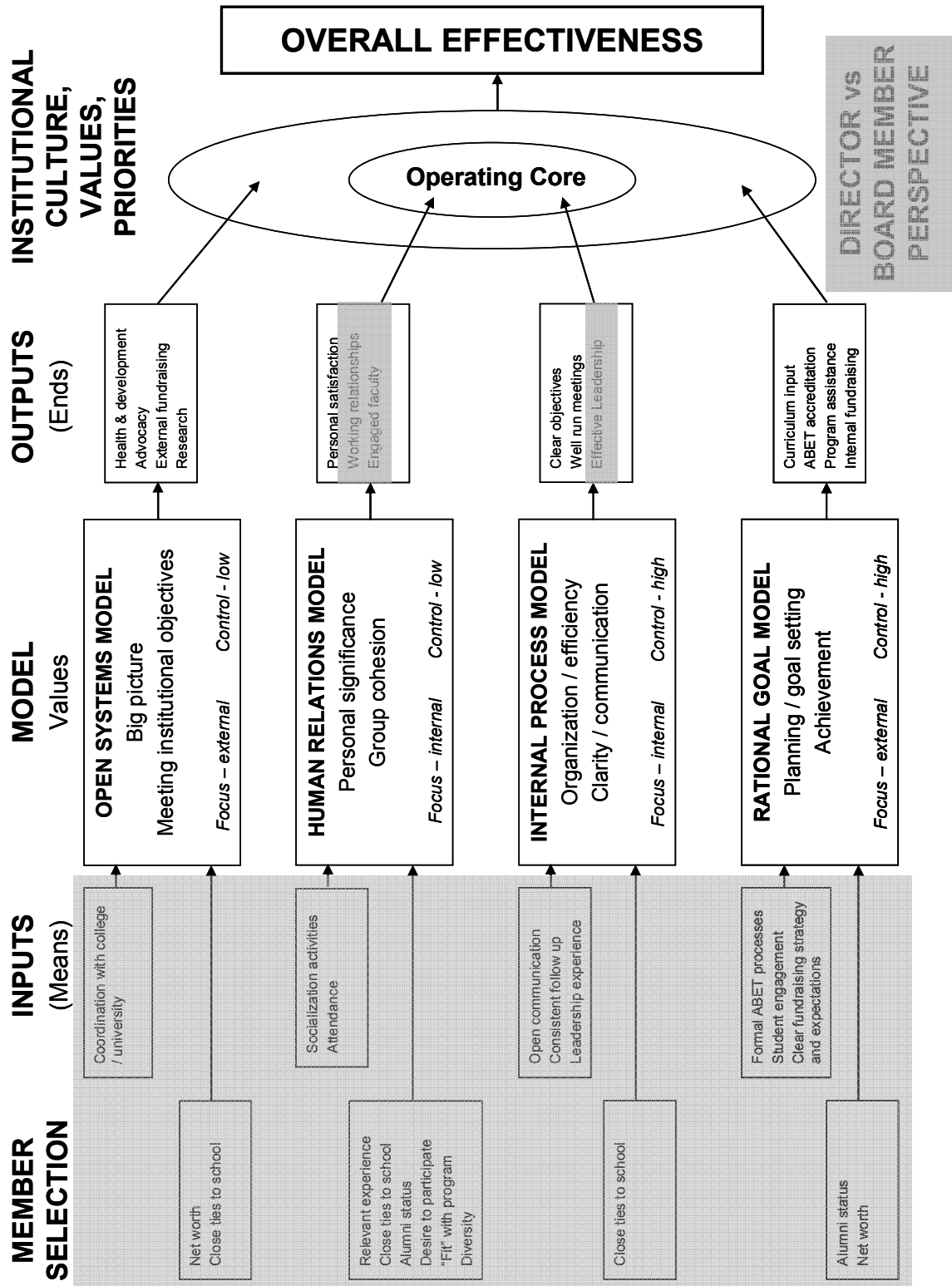


Figure 7.1. Updated overall effectiveness model.

modeling actual board operation. The research has provided significant insight into the variables that do correlate positively with different elements of effectiveness and the final model has been updated to reflect these relevant effectiveness variables.

7.2.1 Human Relations Model Refinements

The outputs or measures of each of the four effectiveness model elements have held up fairly well from the initial formulation of the model. In the initial model, “Personal satisfaction” and “Group morale” were the two elements postulated as measures of Human Relations effectiveness. Personal satisfaction remains, but “Group morale” has been redefined as “Working relationships” in order to better describe this factor as it was studied in the survey. A new element, “Faculty engagement” which emerged from the research is now seen to be an important element of the relationships of the board and has been added as an output of the Human Relations model.

In the Human Relations model, member attendance and the use of socialization activities by the board were found to be the only operational factors that influence effectiveness in this space. A large number of factors were identified as significant in the selection of members that would contribute to a positive working environment on the board. These selection criteria are relevant work experience, close ties to the school (often seen as alumni status), a strong desire to be involved, personality and fit with the rest of the board, and diversity of board membership.

7.2.2 Internal Process Model Refinements

“Meetings”, “documentation” and “role clarity” were theorized as outputs of Internal Process in the original model. Based on interviews and data provided from the

surveys, “Role clarity” was more clearly defined as “Clear objectives” for the board, as it appears that clarity of overall board objectives is more important than the individual board member role. Participants did not consider documentation to be a critical element of effectiveness and thus this factor was removed from the model. On the other hand, effective board leadership, particularly the leadership of the board chair, was added as a significant factor based on strong input from the case study and from the survey.

With regard to input variables for the model in the Internal Process space, open communication, consistent follow up by the school on board actions, and the experience of board leadership are seen as key operational factors. The strength of board member ties to the school appears as the only factor in member selection that is significant in this space.

7.2.3 Rational Goal Model Refinements

The literature speaks of eight major objectives of an advisory board, and these eight objectives were mapped into the effectiveness model as outputs of the Rational Goal and Open Systems model elements. The Rational Goal model deals with board objectives that can be accomplished with internal board focus and resources, and all four outputs associated with this component (curriculum input, ABET accreditation, program assistance, and internal fundraising) were seen as contributing to overall effectiveness, so the model is unchanged in this area.

The Rational Goal model shows that having a formal process for board involvement in the ABET accreditation process, board engagement with students, and clearly defined and supported fundraising objectives are important as far as operational

processes are concerned. In selecting members, alumni are an asset, and with programs that value internal fundraising, member net worth is a factor.

7.2.4 Open Systems Model Refinements

The Open Systems model prescribes objectives that require interaction and support with systems outside the board and program environment. Of the four objectives that were initially identified in this space, three (health & development, advocacy, and research) were seen as correlating to overall effectiveness. The fourth, external fundraising, did not correlate to overall effectiveness but was identified as a desired objective by some programs, so it remains in the final model.

The only operational input seen in the Open Systems model is the importance of coordinating board activity with the rest of the college or university. With regard to member selection, the influence of strong ties to the school shows up again, and for programs that wish to use their boards to help with external fundraising, net worth is again a factor.

7.3 Model Limitations and Application

The updated model (Figure 7.1) represents a framework for viewing the effectiveness, operation, and member selection of engineering advisory boards. The model should be viewed as illustrating overall operation of the board from a qualitative perspective rather than as a quantitative model. The model should be thought of as a general depiction of advisory board operation and not be considered a strict representation of the input / output relationships. Elements that appear as inputs in one context might be better viewed as outputs in another, and there are complex interactions

involved in many of the elements. An example is attendance at board meetings, shown as an input to the Human Relations model. The argument could be made either that the working relationships on the board are poor because there is poor attendance, or that the attendance is poor because the working relationships are poor.

Even with these limitations, this model is of significant value to leaders of engineering programs and advisory boards in helping to understand the strengths and weaknesses of these boards and improve their effectiveness.

CHAPTER 8: SURVEY SUMMARY AND PRACTICAL IMPLICATIONS

8.0 Summary

This chapter presents a summary of the research and conclusions from the survey regarding program director and advisory board member perspectives on board effectiveness. It covers the same material as chapter six, but is intended as a more succinct and stand-alone report on the survey research and provides a discussion of the lessons learned regarding a strategy for building and maintaining an effective industry advisory board.

8.1 Abstract

The use of voluntary advisory boards composed primarily of industry practitioners to give aid and advice is almost universal in engineering education programs. The goals, operation, and composition of advisory boards have significant variation across programs. Some schools have established valued and effective advisory boards while others struggle with poor working relationships and difficulty accomplishing their objectives. Through the use of a survey of engineering school directors and advisory board members, this research characterizes the effectiveness, operation, and makeup of advisory boards.

Effective boards are characterized by strong leadership, both from the school director and board chair. These boards tend to have membership characterized by individuals with relevant work experience, a strong desire for involvement with the

program, and close ties to the school. A high percentage of members are typically alumni of the program. Membership represents a diversity of industry and work experience, though not at the expense of members feeling comfortable in the board environment. Board operation encourages engagement of board members with students, provides opportunities for socialization between board members and with faculty, and has formal procedures for involvement of the board in the ABET accreditation process. The school maintains open and candid communication with board members and consistently follows up on actions from the board. Advisory board activity is coordinated with the rest of the college or university.

Significant differences are seen between programs in the role of the advisory board with respect to fundraising. Some programs deliberately do not involve the board in any aspects of fundraising, while others very successfully use the board in this role. For other programs, fundraising is a source of conflict and frustration. Boards can be effective with or without involvement of board members in fundraising, but it is essential that expectations in this area are clearly understood and agreed upon by the school and the board.

8.2 Introduction

The use of voluntary advisory boards to give aid and advice to an educational program is common across most university academic divisions, regardless of their field of study. The vast majority of universities offering accredited degree programs in engineering have established some form of advisory structure composed of practicing or retired professionals who are called upon to help support the educational program in

various ways. This structure is referred to in a number of ways, including “board”, “council”, or “committee”, and the members may be called “advisors”, “visitors”, or “associates.” This report will use the general term “Industry Advisory Board” (IAB).

While the use of advisory boards to support engineering educational programs is common, there is relatively little written and no known comprehensive research on what it takes to establish and operate an effective advisory program. Rooney notes, “There has yet to accrue any significant database of literature focusing on the type and level of interaction currently obtained between IABs and the programs they advise” (Rooney 2002, 1). The goals, operation, and composition of advisory boards have significant variation across programs. Some schools seem to have established valued and effective advisory boards, with excellent working relationships within the program. Other boards could be described as perfunctory, non-functional, or dysfunctional. Yet other programs may find that some aspects of the advisory board relationship are working well while other aspects are ineffective.

This report is part of a larger study on engineering advisory board effectiveness being conducted as a doctoral dissertation by the researcher. Another part of this research consists of a more detailed discussion of the advisory board effectiveness model and a case study of an effective advisory board which has been accepted for presentation at the 2007 Frontiers in Education conference in Milwaukee, WI (Appendix E).

8.3 Survey Overview

To help understand the composition and operation of typical advisory boards in engineering education, an on-line survey was created and distributed to engineering

school directors and board members in April and May of 2007. The survey consisted of 116 questions divided into eight major sections (Table 8.1), but not every participant was asked every question. A common set of questions was asked of every participant, but the role of the participant (department director or board member) determined which of the remaining questions were asked.

Table 8.1. Survey content summary.

Content	Number of Questions	Respondents
Introduction and informed consent	1	All
Respondent role and institution	3	All
Questions regarding advisory board objectives	17	All
Questions regarding advisory board effectiveness	7	All
Questions regarding board operation and member selection	44	All
Questions regarding board operation and structure	17	Directors
Questions regarding board operation	11	Board Members
Questions regarding board member demographics	15	Board Members
Final Comments	2	All

Questions soliciting opinion regarding effectiveness, importance, and operation were asked using a 1 to 5 scale, with only the endpoints anchored. A typical question in this format is shown in Figure 8.1. A second type of question with a multiple choice, check box format was used when data was requested on board operation or board member demographics. The third type of question used an open field format, primarily to allow respondents to add comments.

9.1 Indicate the degree to which you agree or disagree with the following statements regarding the operation of your advisory board

	1 Strongly disagree	2	3	4	5 Strongly agree	No opinion
I attend all of the advisory board meetings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure 8.1. Typical survey format for opinion questions.

The survey was distributed to 208 engineering school directors from thirty-eight different engineering institutions. These universities were all classified as research institutions according to the Carnegie classification (Reis 1997). A deliberate effort was made to choose engineering colleges from every geographical region of the United States. Engineering disciplines chosen for this study were Industrial Engineering, Mechanical Engineering, Electrical / Computer Engineering, Computer Science, Civil Engineering, and Chemical Engineering. An e-mail was sent to directors of each program with a link to the on-line survey asking them to consider completing the survey and consider forwarding it on to members of their advisory boards. Respondents were given the opportunity at the end of the survey to provide an e-mail address and request a summary of the research when it was completed. Respondents were promised anonymity in their responses, and that no specific institutions would be identified in any reporting of the results.

8.4 Survey Response

Of the 208 directors contacted, 43 individuals from 42 different engineering education programs at 25 different institutions completed the survey, for a response rate of 21%. Table 8.2 provides details of who responded to the survey. The number and breadth of responses from engineering school directors is sufficient to draw meaningful conclusions regarding advisory board effectiveness. However, there were significantly fewer programs represented in the responses from advisory board members. Forty-seven responses were received from advisory board members but only nine different engineering programs were represented in that sample. The sample was further limited in

that two programs represented eighteen of the 47 responses. The relatively small number of programs represented in board member responses means that caution must be exercised in generalizing board member responses as representing all engineering programs. There are also too few programs represented to do significant paired comparisons of board member and school leadership response within the same program. This survey sample cannot claim to be broadly representative of engineering school directors or board members as there was a high degree of self-selection involved in the survey responses.

Table 8.2. Survey responses by respondent category.

Role	Discipline	Number of Institutions	Number of Participants
Director	Chemical Engineering	6	6
	Civil Engineering	7	7
	Computer Science	3	3
	Electrical / Computer Engineering	8	9
	Industrial Engineering	11	11
	Mechanical Engineering	7	7
	TOTAL	42	43
Board Chair / Board Member	Chemical Engineering		
	Civil Engineering	1	6
	Computer Science		
	Electrical / Computer Engineering	3	12
	Industrial Engineering	4	19
	Mechanical Engineering	1	9
	Unspecified		1
	TOTAL	9	47

8.5 Survey Analysis

The statistical analyses performed in this study assume that the 5-point Likert scale survey responses can be treated as interval data rather than ordinal data in order to take advantage of more powerful parametric analysis tools. Opinion survey questions were set up with defined endpoints (e.g., 1 means strongly disagree and 5 means strongly agree) but no defined meanings for the intervening numbers. This was done deliberately

to make respondents think in terms of equal interval responses rather than purely ordinal or ranked responses. This allowed the response data from the survey to be considered “approximately” interval. There is debate in the literature on the appropriateness of using parametric analysis techniques with ordinal data. Labovitz (1967, 153) shows that using rank-ordered data, particularly data that approximate an interval scale, “rarely alters the results of statistical analysis to an appreciable degree”. The practical implications of this approach are that the statistical significance (p value) of these tests should be viewed with caution, as the underlying data does not meet the strict requirements of data type and normality. In cases where the dependent variable in a correlation was categorical, the responses were ranked and non-parametric analysis performed (Spearman’s Rho), as there was no implication of equal intervals.

The survey analysis was guided and structured according to a model of organizational effectiveness developed by the researcher, based on the organizational effectiveness work of Quinn and Rohrbaugh (1983). This model views overall effectiveness as a high level construct comprised of effectiveness components at a lower level. The mapping of the lower level effectiveness elements to overall effectiveness varies according to the culture, values, and priorities of each program. There are four common elements or sub models for every program that make up the construct of overall effectiveness. These are Human Relations (the working relationships of participants and how positively they view their involvement), Internal Process (the internal organizational structure and processes that allow the board to function), Rational Goal (the objectives of the board that can be accomplished with board planning and resources only), and Open Systems (the operation and objectives of the board that involve interaction with the

surrounding environment). The Human Relations and Internal Process elements provide a foundation that supports the operation of the board, and the Rational Goal and Open Systems elements support the externally deliverable objectives of the board. Significant goals of this research were to identify measures of effectiveness for each model element, and to determine which variables in board operation and member selection could be shown to affect the performance of the board in each of these areas.

8.6 Overall Effectiveness

The primary assessment tool used in this study was a question in the survey that asked, “Overall, how effective has the advisory board been in accomplishing its objectives?” Responses were given in a 1 to 5 interval scale, with a 1 being “completely ineffective” and a 5 being “extremely effective”. Figure 6.1 summarizes the response to this question, broken out between school directors and board members.

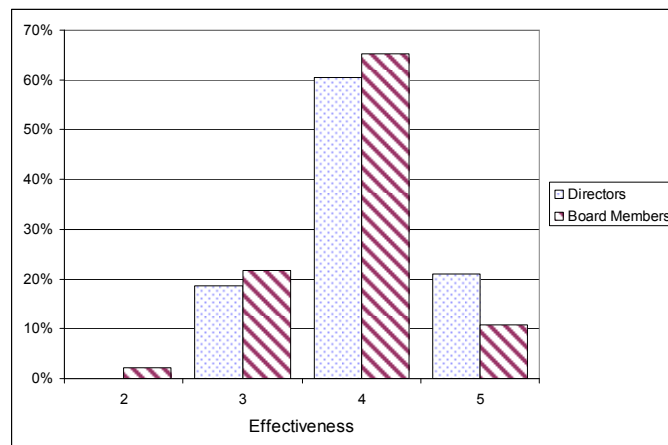


Figure 8.2. Survey response, overall effectiveness.

Clearly respondents to this survey overall feel that their advisory board programs are quite effective. The mean response for school directors was 4.02 and 3.85 for board

members. While directors give a somewhat higher effectiveness evaluation than do board members, this difference is not statistically significant in a two sample t-test ($t_{86} = 1.31, p = 0.195$).

Comments from directors on their advisory board experience were generally positive, with some cautions. “The board works very effectively in recommending items for consideration, and slightly less effectively in delivering or implementing items.” “The advisory board has been effective, though they do have full-time jobs and can let items ... slip through the cracks.” Some board members were very positive: “To this day, I am amazed at the impact our Advisory Board has on the department.” “We like to think that we are extremely effective.” One contrary view from a department director, whose program does not use an advisory board, seems to be a distinct outlier: “In my experience, advisory boards, both at the college and department level, are mostly social exercises. .. I have yet to see an example of a successful industry advisory board.”

8.7 Elements of Overall Effectiveness

There were nine questions asked of survey participants that were directed at assessing the lower level elements of effectiveness of each program in the area of Human Relations and Internal Process. These questions are summarized in Table 8.3. Each response was given on a 1 to 5 interval scale, with a 1 representing “strongly disagree” and a 5 being “strongly agree. A “don’t know” or “no opinion” option was also given, and responses in this category were not considered in the analysis. The mean response to each question, broken out by director and board member, is shown in Figure 8.3. On average board members gave a higher assessment (4.29) of Human Relations and Internal

Process effectiveness measures than did program directors (4.14), although the difference is not statistically significant.

Table 8.3. Survey questions, Human Relations and Internal Process effectiveness elements.

Survey Question	Title	Model Area
<i>Advisory board members get along well with each other.</i>	Working relationships	Human Relations
<i>The faculty is engaged and supportive of the advisory board process.</i>	Faculty engaged	Human Relations
<i>I feel that my time spent on advisory board activity is worthwhile.</i>	Time well spent	Human Relations
<i>I look forward to and enjoy participation in board meetings and board activities.</i>	Enjoy participation	Human Relations
<i>There are clear objectives and the mission of the board is well understood.</i>	Clear objectives	Internal Process
<i>Advisory board meetings are well run and time is well spent.</i>	Well run	Internal Process
<i>The advisory board process is well documented (agendas, minutes, etc.)</i>	Well documented	Internal Process
<i>The advisory board chair is effective in leadership of the board.</i>	Board chair effective	Internal Process
<i>The department director (engineering school head) is effective in directing board activity.</i>	Department director effective	Internal Process

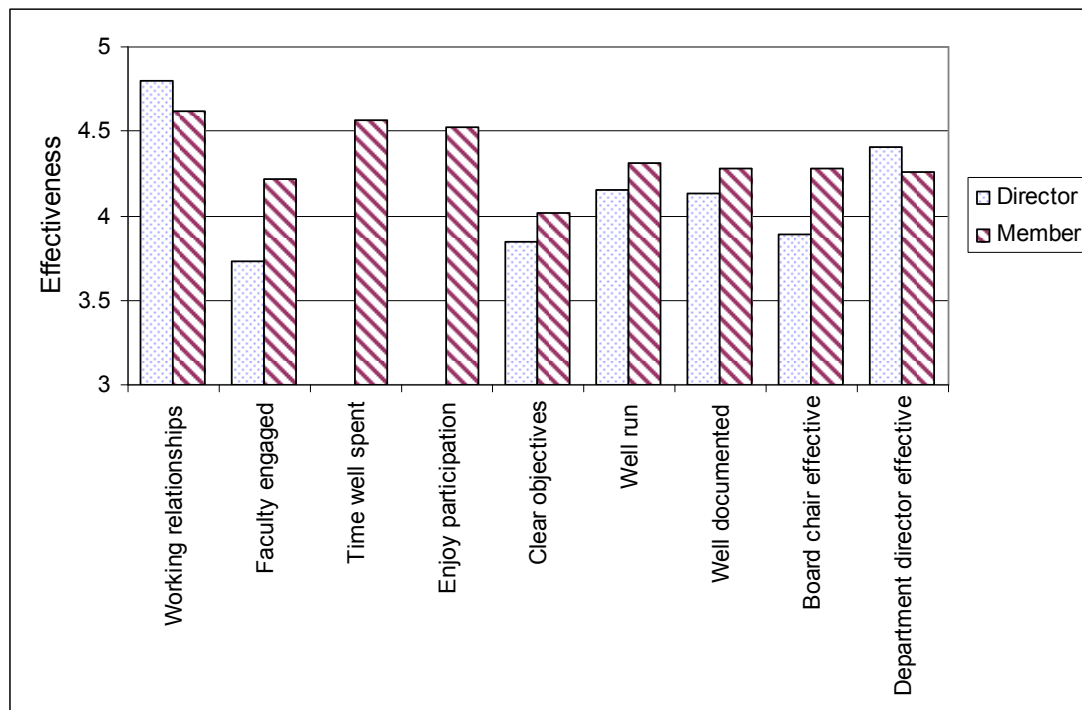


Figure 8.3. Survey response, Human Relations and Internal Process elements.

A correlation was done to examine the relationship of each of these measures of Human Relations and Internal Process effectiveness to overall board effectiveness. The goal was to understand which of these measures correlated significantly with overall

effectiveness. Table 8.4 shows the correlation coefficient (r) and statistical significance (p) of each relationship. Moderate to strong correlations ($r > .35$) are highlighted. While weaker correlations may be statistically significant, the decision was made throughout this analysis to use the threshold of $r > .35$ to help provide focus on those factors that are likely to have more significant influence. This particular threshold was based on a subjective “rule of thumb” that correlations greater than .35 are more notable.

Table 8.4. Correlations of Human Relations and Internal Process measures to overall effectiveness.

Question	Director		Board Member		Model
	Correlation - r	Significance - p	Correlation - r	Significance - p	
Working relationships	0.17	0.310	0.26	0.104	Human relations
Faculty engaged	0.37	0.018	0.55	0.000	Human relations
Time well spent			0.37	0.018	Human relations
Enjoy participation			0.32	0.037	Human relations
Clear objectives	0.38	0.014	0.32	0.041	Internal process
Well run	0.37	0.018	0.30	0.057	Internal process
Well documented	0.29	0.075	0.29	0.061	Internal process
Board chair effective	0.59	0.000	0.41	0.013	Internal process
Department director effective	0.17	0.293	0.26	0.096	Internal process

Some observations can be made from these data. The response to the question regarding working relationships was strongly positive (mean 4.71), with a four or five response by all but one respondent. The correlation to overall effectiveness was positive, but statistically weakened because of the limited range of responses. Good working relationships could be considered foundational for an effective board, and do not appear to be an issue for boards in general. Board members comment on this aspect as a strength of their programs: “We work well together”, and “the closeness of the board.”

Having an engaged faculty shows a strong correlation by both directors and board members to overall effectiveness. Board members give a higher rating to faculty engagement (4.22) than do program directors (3.73), and this difference is statistically significant ($t_{78} = 2.12, p = .011$). It is likely that board members have visibility of only those faculty who are engaged in the advisory board process, while directors see the full range of faculty involvement, including those faculty who have little interest in this process.

Both “Time well spent” and “Enjoy participation” were asked of board members only and have strong positive responses (mean of 4.57 and 4.52, respectively). Both show positive and statistically significant correlation to overall effectiveness. Board members generally feel very positive about their participation in the advisory board process. One board member commented, “I am extremely proud to be a member and strongly feel that we have a great impact on graduating students and are helping them to be better prepared for their future careers!”

When it comes to Internal Process factors, the response is still very positive overall (director mean 4.09 and board member mean 4.23), though not quite as strong as the Human Relations assessment. Department directors show a strong correlation between the assessment of “Clear objectives” and “Well run” and overall board effectiveness. The correlation from board members is positive and statistically significant but weaker.

The variable “Board chair effective” was given a mean response of 4.28 by board members, and 3.89 by directors. This difference is statistically significant ($t_{70} = 2.23, p = .029$), indicating that board members tend to think more highly of the job their leader is

doing than do department directors, though the overall assessment of both is quite positive. Directors give this variable the strongest correlation to overall effectiveness of any of the Internal Process variables (Table 8.4), emphasizing how important the role of the board chair is in their view. Comments by a department director underscore this observation: “The board’s operating effectiveness is in direct relationship to the leadership of the chairman.” It is interesting to note, however, that there were a large number of missing responses to this question (5 of 42 directors, 11 of 47 board members). One director commented, “There is no Industrial Advisory Committee chair”, and a board member, “We don’t have a board chair - the meetings are led by the Department Chair”, indicating that some programs may not use this type of internal leadership structure for the board.

The variable “Department director effective” was given a very positive response, with a director rating of 4.41 and a board member rating of 4.26. The correlation to overall effectiveness was positive but weak and did not reach statistical significance. Department directors in general give themselves high marks in management of advisory board activities, and board members tend to agree, fairly independent of their assessment of overall advisory board performance.

Board members tend to show that Human Relations elements are more significant to overall effectiveness than do directors, and directors tend to show higher correlations between Internal Process elements and overall effectiveness than do board members. This could be stated as a general tendency for board members to place more emphasis on how they feel about their participation in the process in their evaluation of program

effectiveness, and program directors to be more concerned about the “nuts and bolts” of board operation in their evaluation.

From the literature on engineering advisory boards and interviews with advisory board directors and members, eight distinct objectives were identified as the primary purposes of advisory boards. They are described in Table 8.5, which lists a series of questions that were asked of all participants in the survey regarding these objectives. These objectives are divided into a group that are part of the Rational Goal model of board operation and another group that are part of the Open Systems model. Participants were asked to respond indicating the importance of each objective (1 = completely unimportant, 5 = extremely important) and then to respond to the same list indicating the effectiveness of the board in accomplishing these objectives (1 = completely ineffective, 5 = extremely effective). Figure 8.4 shows the assessment by directors and board members of the importance and effectiveness of each objective. In general, directors and board members agree that curriculum input and ABET accreditation are the most important objectives of an advisory board, and internal and external fundraising are the least important.

Table 8.5. Survey questions, board objective importance and effectiveness.

Board Objective	Title	Model Area
<i>Advise program on curriculum content to meet industry needs.</i>	Curriculum input	Rational Goal
<i>Provide input and feedback to help meet ABET accreditation criteria.</i>	ABET accreditation	Rational Goal
<i>Assist with seminars, design projects, graduate placement, mentoring, etc.</i>	Program assistance	Rational Goal
<i>Raise funds for school use from board member personal resources.</i>	Internal fundraising	Rational Goal
<i>Provide input on program health and development opportunities.</i>	Health and development	Open Systems
<i>Serve as an advocate for the program with administration, community, industry, alumni, etc.</i>	Advocacy	Open Systems
<i>Use board member contacts and influence to raise funds from other sources.</i>	External fundraising	Open Systems
<i>Help promote and coordinate research opportunities with industry.</i>	Research	Open Systems

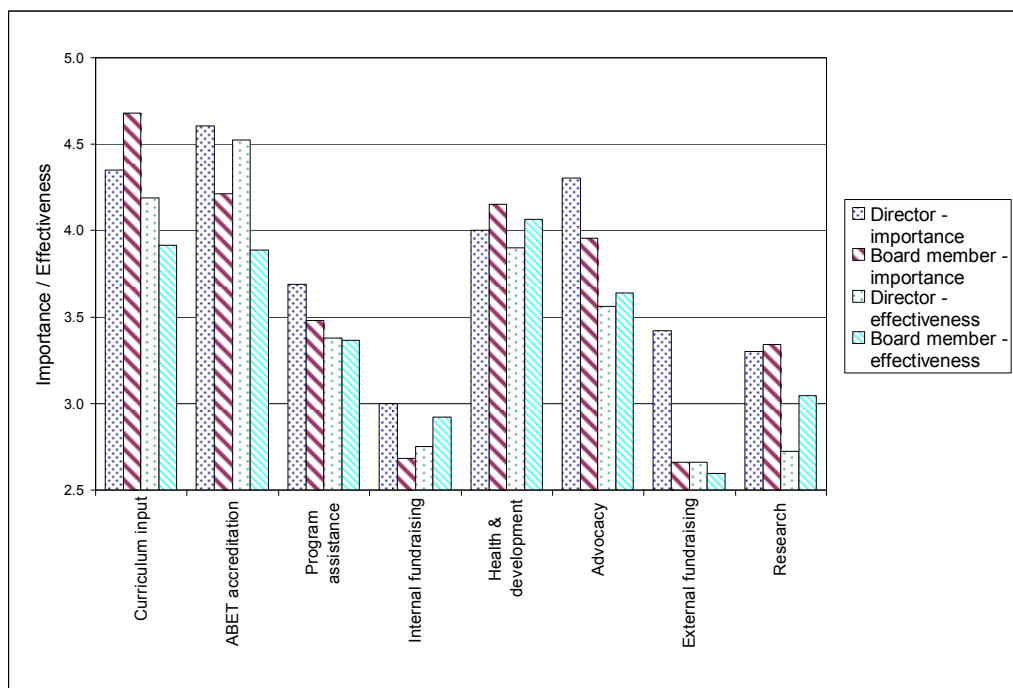


Figure 8.4. Survey response, board objective importance and effectiveness.

Once again, a correlation of these responses to overall effectiveness was examined. The results are shown in Table 8.6, with the moderate to strong correlations highlighted.

Table 8.6. Correlations of objective effectiveness to overall effectiveness.

Question	Director		Board Member		Model
	Correlation - r	Significance - p	Correlation - r	Significance - p	
Curriculum Input	0.59	0.000	0.68	0.000	Rational goal
ABET accreditation	0.39	0.012	0.30	0.047	Rational goal
Program assistance	0.21	0.176	0.58	0.000	Rational goal
Internal fundraising	0.04	0.804	0.35	0.030	Rational goal
Health and development	0.46	0.003	0.58	0.000	Open systems
Advocacy	0.30	0.055	0.46	0.001	Open systems
External fundraising	0.26	0.107	0.24	0.163	Open systems
Research	0.21	0.193	0.57	0.000	Open systems

Curriculum input is most often mentioned and is the archetypical role of advisory boards. The survey confirms its importance from both directors and board members. Curriculum input has the strongest correlation to overall effectiveness of any of the objectives analyzed from both directors and board members. Directors appear to be reasonably satisfied with the contribution of the board in this area (importance to effectiveness difference of 0.17), but board members show the largest gap between importance and effectiveness (0.77) of any of the objectives. This indicates that, on the whole, board members desire the board to have more input and influence on curriculum. This is one area where frustration showed up in comments on the survey by some board members. One member expressed disillusionment about the board's ability to influence curriculum, with the comment, "I am considering withdrawing from this board since I feel ineffectual in it." Another expressed the concern, "Change is too slow to react to market needs." Directors recognize the importance of this role, but are more cautious, believing that board members sometimes have too narrow a perspective on academic and curriculum issues and do not "fully understand academia". Because of the high correlation to overall effectiveness this is an area of board operation that needs clear communication and aligned expectations between administration and board members.

Department directors give the highest importance rating of any board objective to assisting with the ABET accreditation process (4.60) and show a strong correlation of this variable to overall effectiveness. For directors, ABET accreditation is an essential element of their program and advisory board input has become a vital part of this process. One director commented, "I have been using the board primarily to help with the undergraduate accreditation processes." Fortunately, department directors also give very

high marks to the effectiveness of the board in this area (4.52), indicating that advisory boards in general are being used very effectively to accomplish this objective.

“Program assistance” is the title given to activities by individual board members and the board as a whole to assist the students and the program with their own time and efforts, in such areas as assisting with seminars, design projects, graduate placement, and mentoring. It correlates strongly with overall effectiveness as evaluated by board members, but not as strongly or significantly as evaluated by directors.

The topic of fundraising seems to spark the most comments and the widest variety of opinion among advisory board programs. Internal fundraising (fundraising directly from board member’s personal resources) is given the lowest average importance rating of any of the Rational Goal objectives by both directors (3.0) and members (2.68), though the standard deviation is high (1.25 and 1.31). What clearly is happening here is that some programs put a high emphasis on internal fundraising, while others do not. For several programs, there is a deliberate decision to keep the advisory board out of the development or fundraising process. “We do not view our advisory committee as a fundraising tool. We have a different group that serves that purpose”, notes one director. A board member says similarly, “Our advisory board is not involved in fundraising. Our alumni academy takes care of that function.” Other programs are essentially at the same point without a formal policy. “We as a board avoid money raising, aka ‘development’”. Some of us are obviously donors but it never comes up in meetings or otherwise.” In other cases, board members express frustration: “Education of students seems secondary to fundraising”, as do directors for the opposite reason, “The board has not provided leadership on fundraising.” On the other hand, several programs mentioned financial

support and funding of scholarships as one of the strengths of the advisory board. Clearly fundraising is a topic about which everyone has an opinion and there is much disagreement. Internal fundraising effectiveness showed essentially no correlation to overall effectiveness from department directors, and a weak correlation from board members. Figure 8.5 shows an interesting pattern in the correlation of internal fundraising *importance* to overall effectiveness. While one cannot generalize too strongly from this data, it appears that program directors that put a high emphasis on internal fundraising from their board are more likely to be disappointed in the overall performance of the board. On the other hand, board members who believe that fundraising is an important role for the board are more likely to view the board as effective. One interpretation of this could be that any fundraising emphasis should come internally from within the board rather than from department leadership or external pressure. Maximum effectiveness seems to be associated with department leadership taking a clear stand that internal fundraising is not the role of the board, or board members clearly identifying internal fundraising as a priority.

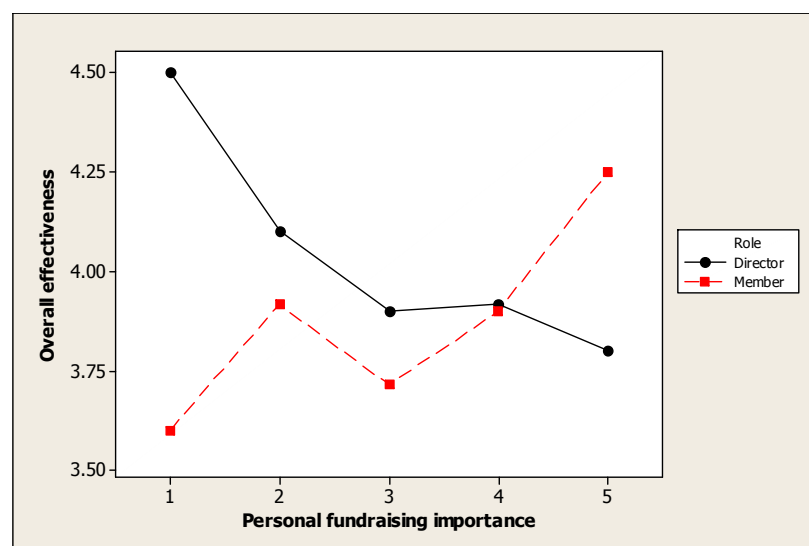


Figure 8.5. Internal fundraising importance versus overall board effectiveness.

Program health and development is activity in which the advisory board works with the program to evaluate and assist in its overall health and development. The survey did not clearly define the meaning of “health and development”, but this could include activities such as strategic planning, competitive program analysis, review of financial health, and assistance in recruiting or interviewing new faculty. Program directors give this objective an importance of 4.00 and an effectiveness of 3.90, indicating that they are fairly satisfied overall with board performance in this area. Board members give an importance of 4.15 and effectiveness of 4.07. For board members, this objective shows one of the strongest correlations to overall effectiveness ($r = .58$) and the correlation by directors is strong as well ($r = .46$).

Program advocacy with industry, community, university administration, and potential students is viewed as a high priority by directors (importance 4.30). Directors also express one of the biggest gaps here between importance and effectiveness with an effectiveness rating of 3.56. This difference is statistically significant ($t_{73} = 3.63, p = 0.001$). Clearly, directors would like advisory boards to be stronger advocates for their programs than they feel that they are. Board members do not see this objective with the same importance (3.96) and the gap to effectiveness is less (effectiveness rating 3.64). Board member evaluation, however, correlates strongly with overall effectiveness ($r = .46$). The correlation to overall effectiveness by directors is weaker ($r = .30$), for reasons that are not clear.

External fundraising, or using the influence of the board with individuals or organizations outside of the board to raise funds, has the same large variation in response as did internal fundraising. Board members give it the lowest importance rating of any

objective (2.66), but program directors give it a much higher importance (3.42). This is the largest disconnect of any objective between directors and board members and is statistically significant ($t_{84}=2.86, p = 0.005$). Directors also see the largest gap between importance and effectiveness in this objective (3.42 to 2.64), which is also statistically significant ($t_{82} = 3.29, p = .001$). Clearly, many directors would like to see advisory boards do a more effective job at using their influence in this area. Board members, however, see almost no gap between importance and effectiveness (2.66 to 2.59). The use of advisory boards for external fundraising may be largely “wishful thinking” on the part of program directors, as there is little correlation of this objective to overall effectiveness.

The last objective studied was research. This involves using the board to help identify or coordinate opportunities for research for the program. As the scope of research was not defined in this question, there is the potential for differences of interpretation, from involvement in a senior design project at one end of the spectrum to a full scale research center at the other. Though this is not a high priority objective for directors, a large and statistically significant gap ($t_{82}=2.67, p = .009$) shows up between the desires of program directors (importance = 3.30) and their assessment of board performance (effectiveness = 2.73). Board members view research with similar importance (3.34) but view the effectiveness of the board higher in this area (3.04). As with advocacy, research shows a strong correlation to overall effectiveness by board members but not by directors, for reasons again unclear. It is possible that board members had a looser definition of what is considered research than did program directors.

8.8 Board Operating Variables

A series of questions were asked of directors and board members to assess actual operation of the board. Some questions were asked of all respondents and others of directors or board members only. Table 8.7 lists eleven of the questions that were asked in an opinion format and indicates to whom they were addressed. Response was on a 1 to 5 scale (1 = strongly disagree, 5 = strongly agree). Figure 8.6 shows the responses to these questions.

Table 8.7. Survey questions regarding board operation.

Survey Question	Title	Respondents
<i>Efforts are made to encourage socialization among board members and with faculty</i>	<i>Socialization</i>	<i>All</i>
<i>There is a wide range of age, culture, background and industry experience represented on the board</i>	<i>Diversity</i>	<i>All</i>
<i>Operation of this advisory board is well coordinated with the rest of the college or university</i>	<i>Coordination</i>	<i>All</i>
<i>I feel comfortable in my role coordinating the work of the advisory board</i>	<i>Director comfortable</i>	<i>Directors</i>
<i>I attend all of the advisory board meetings</i>	<i>Attend meetings</i>	<i>Board Members</i>
<i>I am involved outside of the board meetings in volunteer activity with the program and/or its students</i>	<i>Involvement outside meetings</i>	<i>Board Members</i>
<i>The program is clear and up front regarding expectations about financial contributions from board members</i>	<i>Clear fundraising expectations</i>	<i>Board Members</i>
<i>I am comfortable with the priority and attention given to fundraising by the board</i>	<i>Comfort with fundraising</i>	<i>Board Members</i>
<i>The board is given candid and complete information regarding the state of the educational program</i>	<i>Candid communication</i>	<i>Board Members</i>
<i>The school follows up on actions from the advisory board meetings</i>	<i>Follow up</i>	<i>Board Members</i>

Another series of questions was asked requesting data on board operation, with the responses in a categorical form. A few of these questions were asked to all respondents, but most were asked of directors only as they were felt to be in the best position to know specific information regarding board structure. These responses are shown in Figure 8.7. Additional information was requested of board members regarding their engagement with the board, seen in Figure 8.8

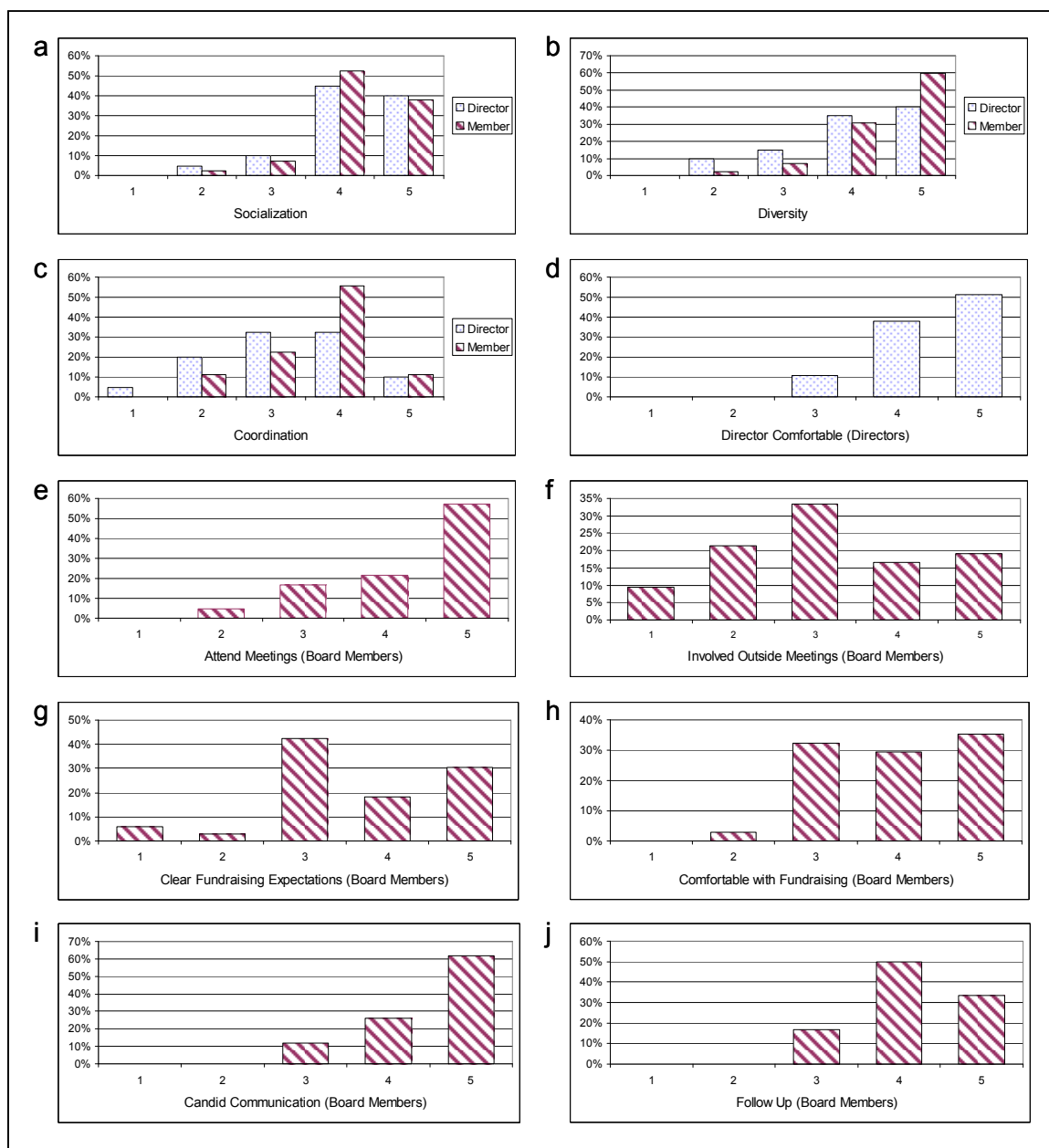


Figure 8.6. Survey responses, board operation.

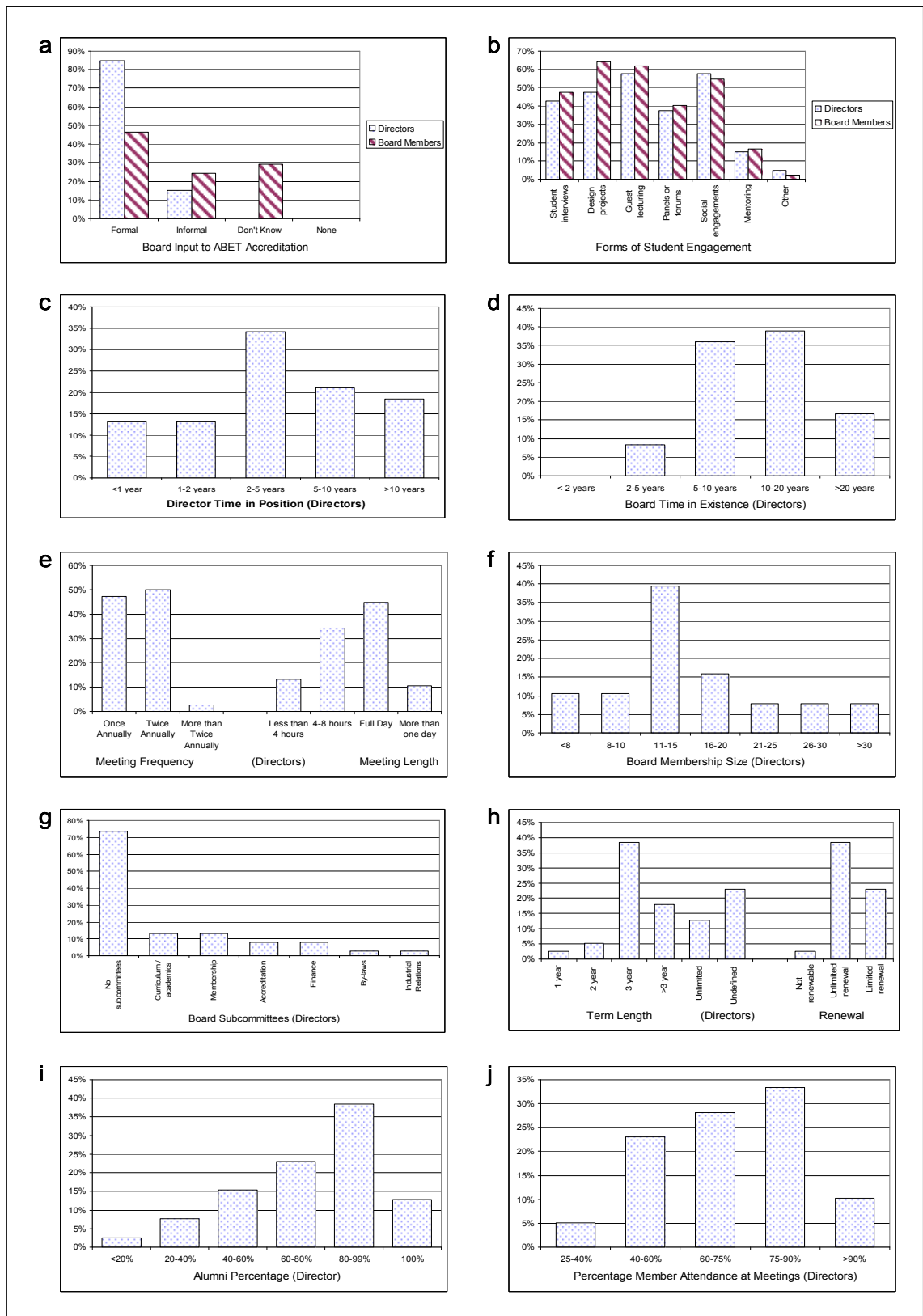


Figure 8.7. Survey responses, board structure and operation.

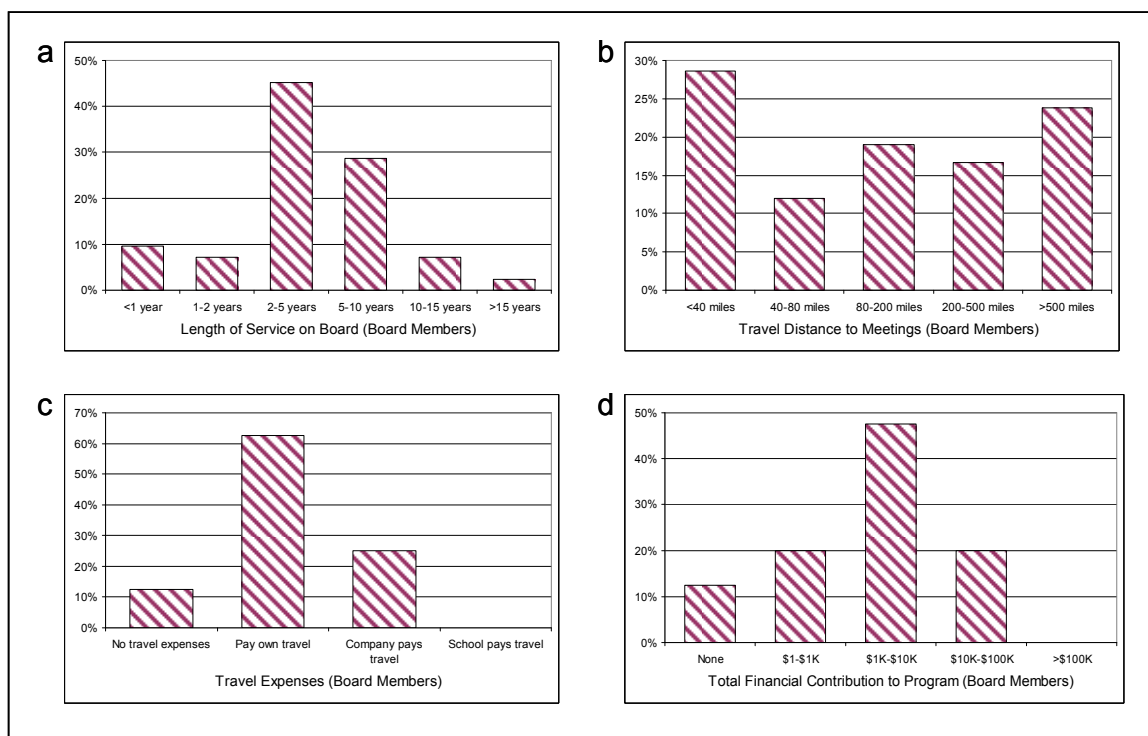


Figure 8.8. Survey responses, board member information.

The goal of analysis in this section was to determine which of the board operating and structure variables were important to board effectiveness. Each of the responses in Figures 8.6 and 8.7 was examined to see if it had an effect on or correlation with overall effectiveness or with one or more of the elements of the four effectiveness sub models discussed in section 8.5. Figures 8.6 and 8.7 give the responses to each of the questions asked in this area, but subsequent discussion will focus only on those parameters that were shown to be correlated to board effectiveness.

The mean response to the question regarding socialization (Figure 8.6a) was 4.23. This response correlates very strongly with “Faculty engaged” ($r = 0.59, p < .001$), which was the strongest Human Relations measure in terms of correlation to overall effectiveness. The interpretation is that most programs do intentionally set out to provide

opportunities for socialization among board members and with faculty, and that this is a strong influence on effectiveness as viewed from the Human Relations perspective.

Board members were asked to indicate how regularly they attended board meetings, and the response is shown in Figure 8.6e, with a mean of 4.31. There are clear correlations between their response to this question and the response to the “Time well spent” ($r = .47, p = .002$) and “Enjoy participation” ($r = .47, p = .002$) measures. These correlations logically suggest that board members who feel that their time is well spent at meetings and enjoy their participation are more likely to consistently attend meetings, and meeting attendance can be a way of assessing the Human Relations effectiveness of a board.

There is quite a range of board membership size, from less than 8 members to more than 30, as indicated in Figure 8.7f. Board size does not seem to have any significant effect on how well a board is run or on overall effectiveness. There is a strong inverse correlation, however, between the size of the board and the percentage of board members who attend meetings (Spearman’s $Rho = -.52$). This relationship implies that board members who are a part of large boards may tend to feel that their presence is not that important to board operation.

Figure 8.7c shows that the typical program director has been in his or her position between two and five years. A correlation of director experience and overall board effectiveness shows a positive relationship (Spearman’s $Rho = .30$) as does director experience with the ratings of “Department director effective” (Spearman’s $Rho = .38$). Director experience should be viewed as an asset for an effective advisory board.

Board members feel good about the level of candid communication and information they are getting from the school (mean 4.50, Figure 8.6i). This variable shows positive correlations with the measure of “Well run” for internal process effectiveness ($r = 0.33, p = .033$) and with overall effectiveness ($r = 0.41, p = .007$). Board members view open and honest communication as a key ingredient for an effective board relationship. Comments from board members on the strengths of their program support this: “Open discussion and evaluation of the program and the staff”, and “Free exchange of ideas and openness of discussion.”

Board members were also asked to indicate their agreement with the statement “*The school follows up on actions from advisory board meetings*”, with the response seen in Figure 8.6j. The response was positive (mean 4.17) and showed strong correlation to ratings of how well run is the board ($r = 0.35, p = .022$) and to overall effectiveness ($r = 0.44, p = .004$). Interviews with board members indicate that they quickly get frustrated if actions taken in board meetings are not consistently acted upon by the school.

ABET accreditation is one of the most important objectives for advisory boards and effectiveness in ABET accreditation has a strong correlation to overall effectiveness as viewed by directors. Both directors and board members were asked whether the board’s input in the accreditation process was best characterized as formal, informal, none, or unknown (Figure 8.7a). Although all respondents indicated that the board played some role in ABET accreditation, almost 30% of responding board members did not know how their input was used. An ANOVA looking at ABET input on the effectiveness of the ABET accreditation objective shows a significant effect ($F(2,76) = 21.63, p <$

.001), and the relationship is illustrated in Figure 8.8. Clearly programs that have a formal process by which board input is used in the accreditation process are viewed as most effective as far as the accreditation process is concerned and programs in which the board members are unclear about their input are the least effective.

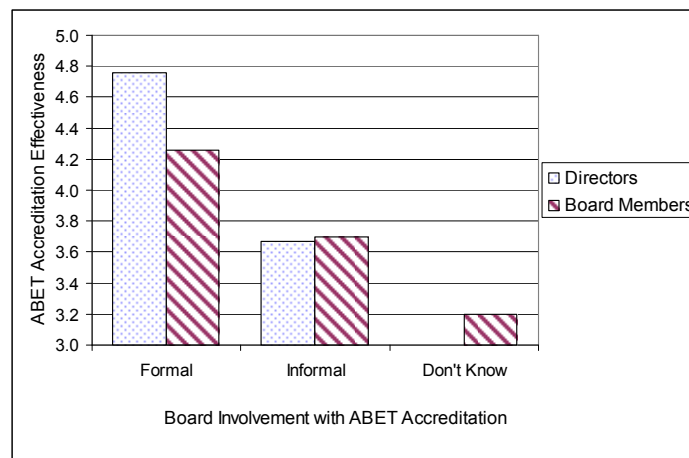


Figure 8.9. ABET input effect on ABET accreditation effectiveness.

Figure 8.7b lists six different types engagement by the board with students, and the percentages of programs that were involved in each type on an ongoing basis. To assist with analysis, a “student engagement index” was created that simply counted the number of types of engagement listed for each respondent. A high student engagement index indicates that the board is engaged with students in many different ways. A correlation of student engagement index against overall effectiveness was run for both directors and members. It shows that from the board member perspective, programs that are more engaged with students are viewed as more effective overall ($r = .32, p = .037$). However, there is no similar correlation from the director perspective ($r = -0.26, p = .105$). Directors, however, do not show this same correlation to overall effectiveness. This is consistent with the finding from section 8.7 that program assistance, which

includes student engagement, shows a strong correlation to overall effectiveness by board members ($r = .58$) but not by directors ($r = .21$). Indications are that the more that board members feel that they are engaging with and directly helping students the more effective they view the advisory board program. It would appear that directors do not share this assessment.

Board members show a wide range of responses to the question, “*The program is clear and up front regarding expectations about financial contribution from board members*” (Figure 8.6g). Similar variation was seen earlier in other ratings regarding fundraising. A correlation of the ratings on financial expectations with the measure of internal fundraising effectiveness shows a strong positive relationship ($r = .38, p = .041$). This is consistent with earlier observations that having clear expectations and agreement between the school and the board on the place and priority of fundraising are essential. Board members were also asked how comfortable they were with the priority and attention given to fundraising, and their response is shown in Figure 8.6h. This variable also strongly correlates to overall effectiveness ($r = .42, p = .017$), reinforcing how important it is that board members “buy in” and align with the fundraising strategy of the board, whatever that might be.

The total amount contributed to engineering programs by each advisory board member respondent is shown in Figure 8.8d. The question specifically asked for the amount contributed to the engineering program with which they were involved, not the college or institution as a whole. The typical advisory board member has contributed between \$1000 and \$10,000 to the program. An ANOVA of the effect of individual contribution amount on the effectiveness of internal fundraising does not quite reach

statistical significance ($F(3,29) = 2.76, p = .060$), but there is a strong effect on the *importance* of internal fundraising ($F(2,35) = 5.09, p = .005$, Figure 8.10). There is a strong relationship between the amount that a board member contributes to the program and how important they feel that fundraising is as a board objective.

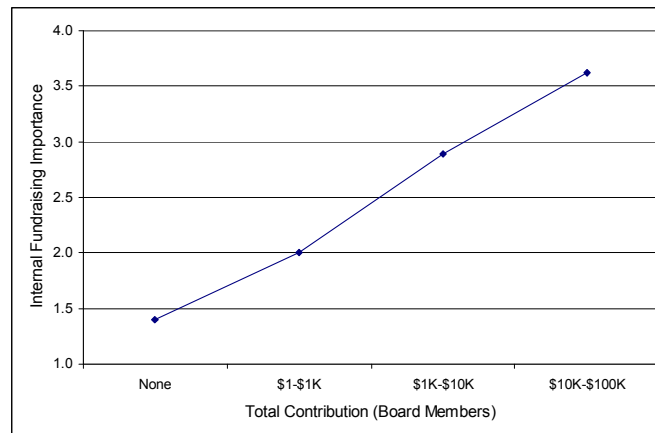


Figure 8.10. Fundraising importance vs. total contribution (board members).

The survey examined the level of coordination between advisory board activity and the larger college or university (Figure 8.6c). A director noted that, “In the past, the development role had not been coordinated with the College of Engineering.” A member expressed frustration that, “University rules ... limit how many of the board’s recommendations can be implemented.” The degree of coordination shows strong correlation with overall effectiveness ($r = .33, p = .004$), external fundraising effectiveness ($r = .34, p = .005$), and research ($r = .49, p < .001$). The implication is that the advisory board should not be allowed to be an isolated “island” (with visibility and communication only within the particular engineering program) and effort should be made to engage and coordinate the advisory board with the larger program of the college of engineering and university. This will pay off in increased effectiveness in several

important areas, even if it does require more time and effort on the part of the program.

Larger fund raising and research projects are typically beyond the scope and leadership of a single advisory board, though the board can play an important role in supporting these efforts with appropriate coordination.

8.9 Board Member Selection

The analysis of the membership composition of advisory boards started with a series of 13 questions (Table 8.8) that were asked of both directors and board members regarding board member selection. Respondents were first asked to indicate how important each of the listed characteristics was in selecting a board member, on a 1 to 5 scale where a 1 was “completely unimportant” and a 5 was “extremely important”. Respondents were then presented with the same set of characteristics and asked to indicate how well the board composition aligned with the indicated priorities. Response was again on a 1 to 5 scale, with a 1 being “completely unsuccessful” and a 5 being “completely successful”. A “don’t know” option was also given for this second series of questions.

Table 8.8. Survey questions regarding board member composition.

Survey Question	Title
<i>Personality and "fit with director, faculty and present board members</i>	Personality and fit
<i>Personally known and recommended by faculty or other board members</i>	Personally known
<i>Strong desire to be involved with and support the program</i>	Desire to be involved
<i>Close ties and ongoing relationship with the school</i>	Close ties to school
<i>Recognition for past contribution to the school</i>	Recognition
<i>Brings leadership or other needed skills for internal board operation</i>	Brings skills
<i>Work experience or expertise in a relevant engineering or educational field</i>	Relevant experience
<i>Association with a company that is a potential employer of program graduates</i>	Potential employer
<i>Senior leadership status and influence in industry, government, etc.</i>	Status and influence
<i>Promote relationship with a strategic company, government or other organization</i>	Strategic relationships
<i>Individual net worth</i>	Net worth
<i>Availability (time, proximity to school, etc.)</i>	Availability
<i>Diversity (industry, age, gender, race, etc.) to help round out the board</i>	Brings diversity

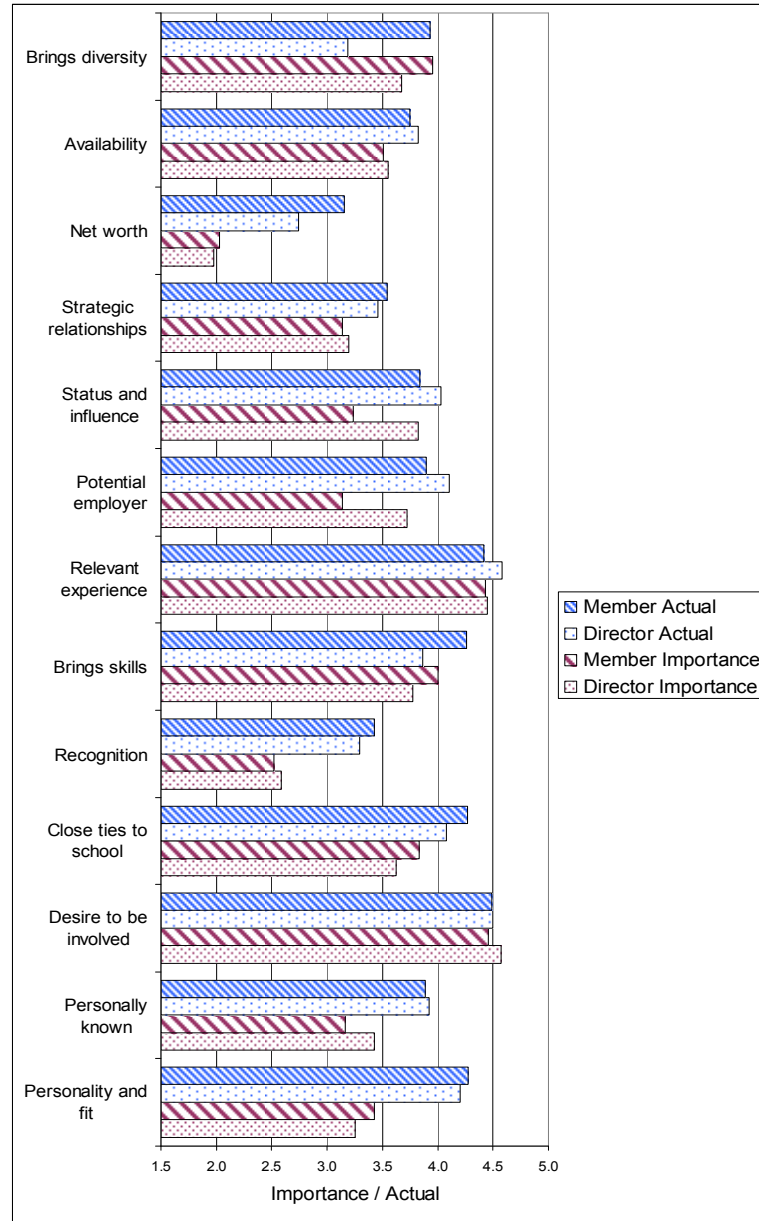


Figure 8.11. Membership composition, importance and actual representation.

Figure 8.11 shows the mean response to these questions. Directors and members alike view a desire to be involved and relevant work experience as the most important characteristics for board members (4.51 and 4.44 respectively). They also agree that individual net worth and the desire to recognize past contributions to the school are the least important reasons to invite an individual into board membership (2.00 and 2.56).

In another series of questions, board members were asked to provide demographic and participation information that would be helpful in understanding the composition of their advisory board. Questions were asked regarding age, gender, minority status, education, career, net worth, giving, relationship to the advisory board, and travel. The responses are summarized in Figure 8.12. The typical advisory board member is approximately fifty-five years old, a white male with significant education, an alumnus of the program on whose advisory board he is serving, a senior manager or executive in a manufacturing company, and has a net worth of approximately \$1 million. There is a wide range of travel required for board members to attend meetings and board members typically pick up their own travel expenses. There were no cases in which the engineering program reimbursed members for travel.

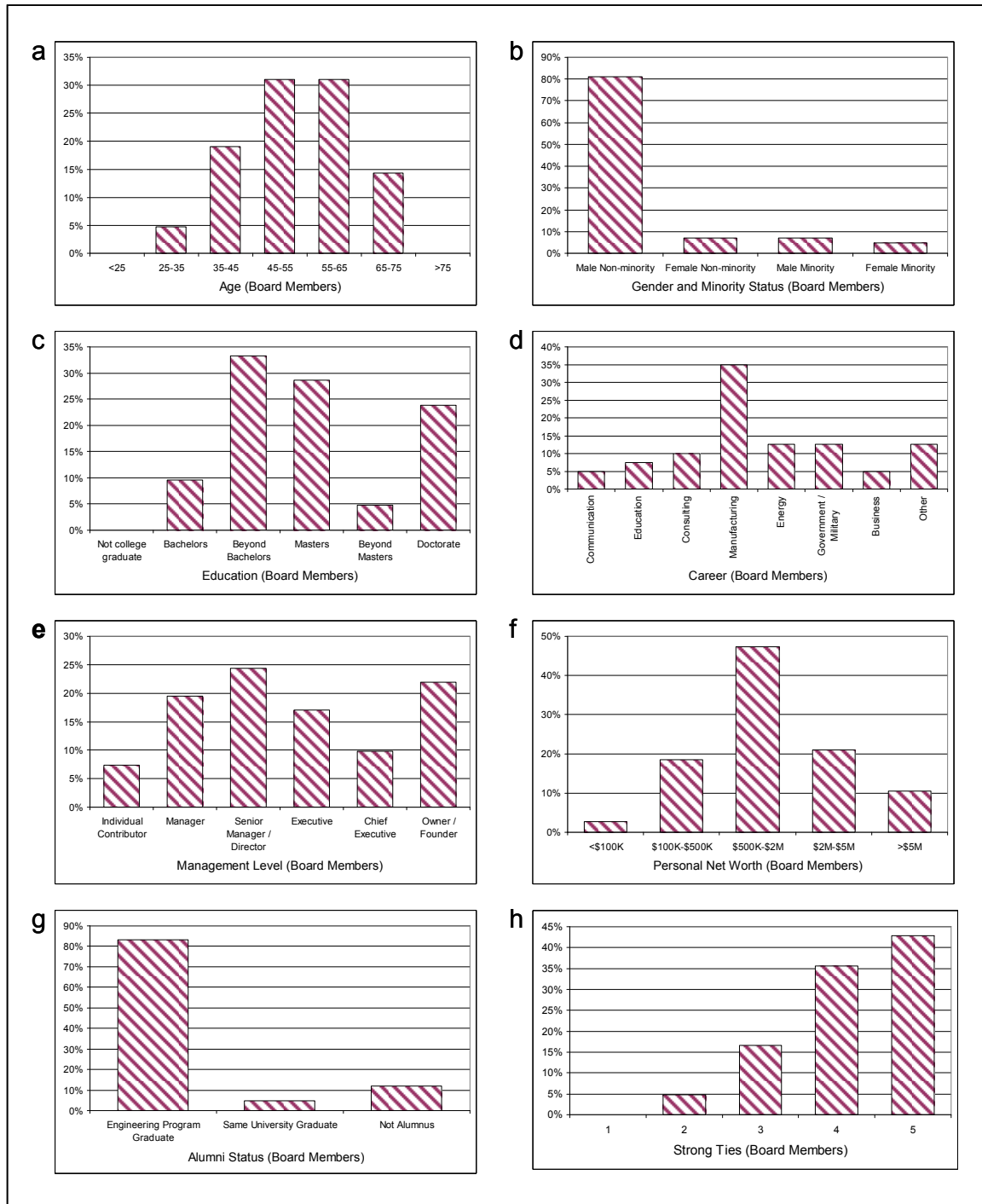


Figure 8.12. Board member demographics.

As with board operating characteristics, these responses regarding member selection characteristics and demographics were examined to determine the effect of

advisory board composition on measures of board effectiveness. The effectiveness measures based on member characteristics were correlated with measures of effectiveness in the Human Relations space. Table 8.9 shows the results, with moderate and higher correlations ($r > .35$) highlighted.

Table 8.9. Correlations of member selection characteristics with Human Relations factors.

Selection Criteria	Effectiveness Correlation					
	Working relationships (all respondents)		Time well spent (board members)		Enjoy participation (board members)	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
Personality and fit	0.39	0.000	0.20	0.215	0.45	0.004
Personally known	0.28	0.014	0.17	0.319	0.32	0.054
Desire to be involved	0.21	0.062	0.44	0.005	0.60	0.000
Close ties to school	0.24	0.038	0.32	0.053	0.48	0.002
Recognition	0.14	0.250	0.22	0.217	0.23	0.203
Brings skills	0.19	0.105	0.34	0.033	0.46	0.003
Relevant experience	0.35	0.001	0.50	0.001	0.64	0.000
Potential employer	0.26	0.026	0.39	0.015	0.36	0.028
Status and influence	0.10	0.393	0.02	0.899	-0.03	0.840
Strategic relationships	-0.07	0.531	-0.16	0.335	-0.13	0.437
Net worth	-0.14	0.270	-0.22	0.279	-0.16	0.443
Availability	0.16	0.158	0.27	0.095	0.30	0.059
Brings diversity	0.13	0.269	0.17	0.299	0.36	0.021

The member selection characteristic that has the strongest and broadest correlation with Human Relations effectiveness is relevant work experience. Directors and board members also ranked this as one of the most important characteristics in member selection (importance rating 4.44). Clearly it is essential for board effectiveness that a high proportion of board members have careers that are directly relevant to the program with which they are associated. Working relationships are enhanced with ties of common interest not only with the program but between members who have similar work

experiences to share and can use the board environment for career “networking”. Board member association with a company that is a potential employer of students also shows as a positive correlation, though not as strong. From the perspective of Human Relations, this is likely another way of saying that the board member is involved in a career that has direct relevance to the program and its graduates.

Also showing a strong correlation to Human Relations effectiveness is the desire on the part of a board member to be involved with the program. This also shows as a top priority by both directors and board members in the selection of a board member (importance rating 4.51). This is a logical relationship, as board members with a strong desire for involvement are likely to participate in the program with greater consistency and enthusiasm and will feel better about their involvement. “Personal commitment and sincere concern for the program” and “a desire to help” are cited by board members as strengths of their programs. Those who participate because they were assigned as a company representative or out of a sense of duty are less likely to actively contribute to a positive working environment.

The strength of board member ties to the school is a significant factor in the dynamics of board operation. Board members with close ties to the school are more likely to personally enjoy their participation with the advisory board program ($r = .48$). There is a strong correlation between the strength of the ties to the school as expressed by board members (Figure 8.6k) and their assessment of overall effectiveness ($r = .60$, $p < .001$) and key measures of Human Relations effectiveness - “Time well spent” ($r = .47$, $p = .002$) and “Enjoy participation” ($r = .50$, $p = .001$). In most cases it is likely that these ties are those of an alumnus who is remaining connected with or reconnecting with a

program from which he or she graduated. A one way ANOVA assessing members' response to "Time well spent" as a function of whether or not they are a program graduate shows a statistically significant effect ($F(1,40) = 4.84, p = .034$). An ANOVA to examine the effect of graduate status on ratings of "Working relationships" and "Enjoy participation" shows similar trends, though not statistically significant ($p = .073$ and $.081$, respectively). These effects are seen graphically in Figure 8.13, showing that program graduates have a more positive view of their participation in the advisory board (average response 4.65) than do non-alumni (average response 4.00). (The 5.0 rating of "enjoy participation" represents a single response.) Nothing in this research indicated negative effects from having a high percentage of alumni on the advisory board, although concerns were voiced by one program director: "If too many alumni are on the board, it will be biased in favor of the department."

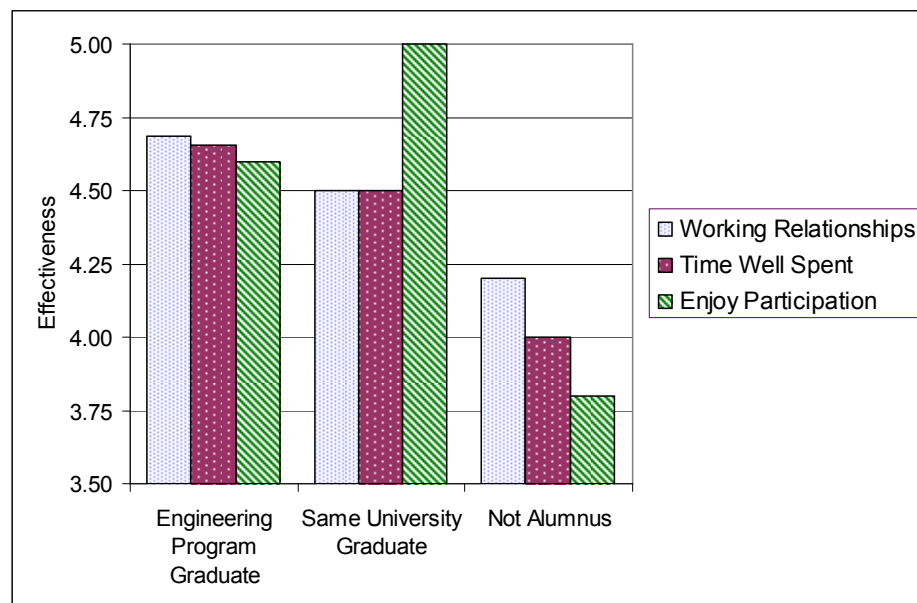


Figure 8.13. Alumni status vs. Human Relations effectiveness factors.

The “Personality and fit” of a board member shows positive correlation with Human Relations measures of “working relationships” among the board ($r = .39$) and the likelihood that the board member will enjoy the experience ($r = .45$). If a board member feels uncomfortable in the board environment or feels a lack of acceptance by the board for cultural, career, personality or other reasons, it is likely that that the board member will be less supportive of the board and less engaged in board activity. Some programs allow board members to attend a meeting or two on a trial basis before extending a formal invitation to membership, so that this issue of “fit” can be explored by both parties.

The effectiveness of the program in bringing members with an appropriate level of diversity on the board shows a positive correlation with board members ratings of “Enjoy participation” ($r = .36$). When board members and directors were asked to evaluate the statement “*There is a wide range of age, culture, background and industry experience represented on the board*”, the response (Figure 8.6b) shows a strong correlation to “Working relationships” ($r = .47$, $p = .002$) by board members. While diversity was very broadly defined in these questions, this does indicate that diversity, however it was interpreted by those answering the survey, is important to Human Relations effectiveness. Board members overall believe their boards are effectively diverse (mean response 4.48). However, it would appear that board members must have in mind diversity other than race and gender, as over 80% of the membership of advisory boards are white males (Figure 8.12b). Diversity is mentioned as a strength by one board member, “We have minorities, women, old, young, active, retired, semi-retired,

academics from other engineering schools”, while a department director praises the “breadth and diversity of the board.”

Survey responses were examined to determine which factors had the greatest effect on member attendance at meetings, as reported by board members (Figure 8.16e). Not surprisingly, those board members who had the strongest ties to the school (Figure 8.6k) were the most likely to attend meetings consistently ($r = .36, p = .021$). There was a greater likelihood for alumni of the program to consistently attend meetings than for non alumni, but the effect was not statistically significant ($F(1,40) = 2.07, p = .158$). Surprisingly, there was essentially no effect on member attendance due to how far members had to travel to attend meetings (Figure 8.8b, $F(4,37) = .68, p = .610$). The interpretation here is that members who are positively motivated and have strong ties to the school will consistently attend meetings regardless of how far they have to travel.

Membership characteristics have a pronounced effect on fundraising by the board. There is a strong relationship between the effectiveness of the board in terms of internal fundraising and the percentage of board members who are alumni, as assessed by program directors (Figure 8.7i; $r = .42, p = .009$). This relationship is seen graphically in Figure 8.14.

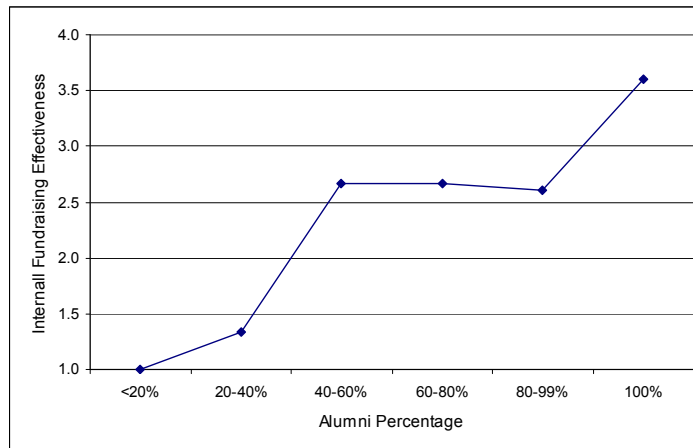


Figure 8.14. Internal fundraising effectiveness versus alumni percentage (directors).

Although net worth of board members (Figure 8.12f) is said by both directors and board members to be relatively unimportant in the selection of board members (importance 2.00), there is a positive correlation between the effectiveness of the board in internal fundraising and the composition of the board in terms of net worth of members ($r = .36, p = .006$). It is significant to note, however, that 13% of the directors and 38% of the board member participants indicated “don’t know” in evaluating board composition with respect to net worth, a higher percentage than for any other question in the survey. It does appear that directors are more conscious than board members of the net worth of the board. When the actual contribution level of board members (Figure 8.8d) is compared against their ranked net worth, a Spearman’s Rho of .52 results, showing a strong positive correlation. When the response of individual board members to the question regarding the *importance* of internal fundraising is compared with the net worth of the same board members, a moderate positive correlation is seen (Spearman’s Rho = .31).

As was the case with internal fundraising, board member assessment of the net worth of the board is positively correlated to external fundraising ($r = .42, p = .012$). While external fundraising is concerned with raising funds from outside the board rather than board members personally, it is a logical assumption that board members with greater net worth are more likely to have relationships and be in positions to influence the contributions of others. If fundraising is a program priority (both internal and external) and the desire is that board members support this priority, these data suggest that alumni with higher net worth should be sought as board members. As the accumulation of net worth is a function of time, it should come as no surprise that there is a strong correlation between the age and net worth of board members ($r = .63, p < .001$).

There is a positive correlation between board members' response to the question regarding the strength of their ties to the school (Figure 8.6k) and the effectiveness of the board in program advocacy ($r = .47, p = .002$). This indicates that members who have close ties to the school are more likely to be passionate supporters of the program and use their influence to promote the school with future students, university administration, industry, etc.

8.10 Practical Implications for Board Effectiveness

The overall effectiveness of an advisory board is dependent on a large number of factors, including the culture, value, and priorities of the institution. This research has shown differing views of advisory board effectiveness and priorities among different programs as well as among program directors and board members. However, there are common themes that emerge among effective programs.

Nowhere is the variation between programs seen more clearly than in differing attitudes and approaches to fundraising. Some programs choose not to involve their advisory boards in fundraising while others have engaged their advisory boards very successfully in this area. For yet other programs, fundraising has become a source of frustration and contention. This research highlights the importance of clear communication and expectations in this area. If the program does choose to make fundraising a priority, board members must have “bought in” to this emphasis, and leadership on fundraising initiatives should come from the board rather than from the school. Effective programs with a fundraising priority will most likely have a high percentage of senior members who are alumni and have substantial net worth. Programs can also be effective with a deliberate decision not to make fundraising one of the board objectives. Clarity and unity of purpose in this area are vital.

Directors and board members do often have different perspectives and emphases with respect to advisory boards. Board members tend to judge effectiveness based on how they feel about their involvement in the process, and to what extent they believe they are directly engaging and impacting the students. Directors evaluate effectiveness with greater emphasis on the mechanics of board structure and operation, and on accomplishing the larger objectives of the educational programs.

With these differences in mind, there are some common themes and practices that are associated with effective boards. These will be addressed as they affect each of the four major elements of effectiveness – Human Relations, Internal Process, Rational Goal and Open Systems.

An effective board from a Human Relations perspective will have good working relationships within the board and with faculty, and board members who feel positive about their involvement and believe their time is well spent. Faculty will be positively engaged in the advisory board process. Human Relations effectiveness can be enhanced by implementing the following:

- Structured activities which promote socialization between board members and with faculty.
- Board membership characterized by individuals with relevant work experience, a strong desire for involvement in the program, and close ties with the school.
- A high percentage of board members who are alumni of the program.
- Broad and diverse membership, though not at the expense of board members “fitting” or feeling comfortable in the board environment.

An effective board from an Internal Process perspective processes in place to ensure that the board has clear objectives, is well run, and has effective board and department leadership. Internal Process effectiveness can be influenced by the following:

- A department director with experience in the role of board coordination.
- Open and candid communication with board members.
- Consistent follow-through on actions from board meetings.
- Membership with strong ties to the program who consistently attend board meetings.

Four objectives of an advisory board are seen in the Rational Goal space as tasks that can be accomplished largely with internal board planning and resources. These are input to curriculum, support for ABET accreditation, program and student support, and

internal fundraising. To effectively accomplish these objectives, the following should be considered:

- Formal procedures for board involvement in the ABET accreditation process of which board members are aware.
- Engagement of board members with students in activities such as panels and forums, interviews, design projects and social events.

The remaining four objectives of an advisory board are considered part of the Open Systems model, as they involve interaction of the board with the surrounding community. These are program health and development, program advocacy, external fundraising, and research support. These objectives can be accomplished most effectively with the following:

- Coordination of advisory board activity and priorities with the college and university.
- Board membership with close ties to the school who are motivated to be advocates for the program.

8.11 Conclusions and Further Study

This study has shown that the majority of engineering program directors and board members view the advisory board as a significant asset to the engineering program and view their own involvement positively. This research supports a model of overall effectiveness that has four essential elements (Human Relations, Internal Process, Rational Goal, and Open Systems) and has identified board operating and member selection variables that correlate with effectiveness in each area.

This research was limited by the relatively few number of programs which had both director and board member response to the survey. A greater response of board members across a larger number of programs would allow more paired analysis within programs and help clarify differences in priorities and perspective between directors and board members.

CHAPTER 9: SUMMARY, LIMITATIONS, AND FUTURE RESEARCH

9.1 Summary

This chapter summarizes the research and its findings. The research problem and methodology are briefly reviewed, a proposed model of advisory board effectiveness is outlined, and a summary of research findings from the case study and survey is presented. Conclusions from the research are drawn, along with some practical applications of the research in the operation of advisory boards. The limitations of the study and areas for future research are outlined.

9.2 Research Problem and Methodology

While the use of advisory boards to support academic engineering programs is common, there has been little formal research on the effectiveness of these advisory board programs. The broad goal of this research was to answer the question, “What does it take to establish and operate an effective industry advisory board in engineering education?” To help answer this larger question, four research questions were investigated:

- How is overall effectiveness defined and assessed?
- What are the elements that make up effectiveness and how are they measured?
- What are the factors that influence effectiveness?
- How does board member selection influence effectiveness?

The study reviewed literature on the use of advisory boards in education in general and in engineering education in particular. Literature on the broad subject of organizational effectiveness was reviewed, and from that literature, a comprehensive

model of advisory board effectiveness was developed. Using this model as a guide, a research strategy was developed which included both qualitative and quantitative elements.

The first phase of the research was approached as a qualitative case study, investigating two engineering advisory board programs at the University of Oklahoma. It included interviews with selected individuals in educational leadership, advisory board leadership, and advisory board members. Observation of board meetings along with document reviews of instruments such as charters, agendas, and meeting minutes from these programs were also incorporated. The second phase was a larger scale quantitative survey of educational institution leadership, advisory board leadership, and advisory board members in engineering education institutions across the United States. The general structure and specific questions asked in the survey were informed by the effectiveness model and the results of the case study interview.

9.3 A Model of Advisory Board Effectiveness

Based on research on organizational effectiveness by Quinn and Rohrbaugh (1983), a comprehensive model of organizational effectiveness was developed. This model was refined based on the findings of the case study and survey (see Figure 7.1). This model recognizes overall effectiveness as a construct made up of elements of effectiveness at a lower level of abstraction. The weighting of each of these lower level components of effectiveness is dependent on the perspective of the observer and is influenced by the observer's role in the advisory board process (school leadership or board member) and the institutional culture, values, and priorities.

The model has four major elements that together compose the construct of overall effectiveness. Each of these represents a different aspect or perspective on board operation. The first is referred to as the Human Relations model, which emphasizes the interpersonal working relationships on the board. The second is the Internal Process model which focuses on the internal process and procedures of the board which are required for ongoing operation of the board. These two elements form the operating core or foundation on which the objectives of the board can be accomplished.

The other two model elements are where the objectives of the advisory board are accomplished. There are eight objectives for the existence of a board identified in the literature and through this research. Four of these objectives (providing input to the curriculum, providing input to the ABET accreditation process, assisting the program and its students, and contributing financially to the program) are considered part of the third model element, referred to as the Rational Goal model. This model considers what the board can accomplish with internal planning and resources. The other four objectives of the board (program health assessment and development, program advocacy, raising funds from external sources, and assisting in the research mission of the school) are a part of the last model which is referred to as Open Systems. The Open Systems model focuses on the interaction of the board with the larger environment and objectives that require resources and coordination outside of the board.

The overall effectiveness model identifies outputs or measures of effectiveness from each model element. These measures are significant in their correlation with overall effectiveness as seen in the case study or survey analysis. Each model element also has identified inputs or variables that are seen in the research as significant in influencing the

effectiveness of that model. These inputs are divided into operating aspects and member selection aspects.

9.4 A Case Study of an Effective Advisory Board

Fourteen interviews were conducted with school leadership and advisory board members from two engineering programs at the University of Oklahoma. Five advisory board meetings between these two programs were observed over a period of eighteen months. In the observation and interview process it became clear that one of the advisory boards being studied was viewed by all involved as particularly effective. Of particular interest was the observation by many who had been involved in the program over an extended period of time that this had not always been the case for this board. In the period of time before the late 1990s, board operation was described as perfunctory, and for a period of a couple of years in that time the board did not meet at all. This raised the question of what changed in the board and its operation to result in such a significant turnaround in effectiveness. After studying this board, both in terms of current operation and from a historical perspective, it was felt that this board could serve as an excellent case study in the operation and composition of an effective industry advisory board.

In this case study all four elements of the effectiveness model were observed in operation. Some conclusions were drawn about the key ingredients for the success of this board. Strong leadership by school directors who believed in the advisory board process was seen as the most important element. Board membership consisted of a majority base of experienced, senior executives from a diversity of industries with strong commitment to the school and the profession, along with additional members who brought more

diversity in age, experience, and culture. Board meetings were well organized, with consistent follow through on input from the board, such that board members felt that their time was well spent and that they were adding value to the program. Fundraising initiatives were led by the board and were well defined, with board member involvement expectations clearly understood. These characteristics resulted in a board that continues to be regarded as highly effective by all involved, contributing significantly to the program academically, financially, and strategically.

A summary of the advisory board model and case study from this research have been accepted for presentation and publication at the 2007 Frontiers in Education Conference in Milwaukee, Wisconsin. A copy of this paper as it was submitted can be found in Appendix E.

9.5 Survey Response and Analysis

A ten to fifteen minute online survey was developed which consisted of 116 questions in eight major sections, although depending on the role of the respondent, not every question was presented to every respondent. A link to this survey was distributed via e-mail to 208 school directors of engineering programs across the United States with a request to complete the survey and to send it to advisory board members from their programs. Forty-three directors at 25 different engineering institutions completed the survey, for a response rate of 21%. Forty-seven responses were received from advisory board members representing nine different engineering programs. Two programs represented eighteen of the 47 responses.

The survey analysis confirmed that the overall effectiveness of an advisory board is dependent on a large number of factors, including the culture, value, and priorities of the institution. Nowhere is the variation between programs seen more clearly than in differing attitudes and approaches to fundraising. Some programs choose to not involve their advisory boards in fundraising while others have engaged their advisory boards very successfully in this area. For other programs, fundraising has become a source of frustration and contention. This research points out the importance of clear communication and expectations in this area. If the program does choose to make fundraising a priority, board members must “buy in” to this emphasis, and leadership on fundraising initiatives should come from the board rather than from the school. Effective programs with fundraising as a priority will most likely have a high percentage of senior members who are alumni and have substantial net worth. Programs can also be effective with a deliberate decision not to make fundraising one of the board objectives. Clarity and unity of purpose in this area are vital.

Directors and board members can have different perspectives and emphases with respect to advisory boards. Board members tend to judge effectiveness based on how they feel about their involvement in the process and to what extent they believe they are directly engaging and impacting the students. Directors evaluate effectiveness with greater emphasis on the mechanics of board structure and operation and on accomplishing the larger objectives of the educational programs.

An effective board from a Human Relations perspective will have good working relationships within the board and with faculty, and will have board members who feel positive about their involvement and believe their time is well spent. Faculty will be

positively engaged in the advisory board process. The following are some actions that correlate to Human Relations effectiveness:

- Structured activities which promote socialization between board members and with faculty.
- Board membership characterized by individuals with relevant work experience, a strong desire for involvement in the program, and close ties with the school.
- A high percentage of board members who are alumni of the program.
- Broad and diverse membership, though not at the expense of board members “fitting” or feeling comfortable in the board environment.

An effective board from an Internal Process perspective will have internal processes in place such that the board has clear objectives, is well run, and has effective board and department leadership. Here are some factors that can positively influence this process:

- A department director with experience in the role of board coordination.
- Open and candid communication with board members.
- Consistent follow through on actions from board meetings.
- Membership with strong ties to the program who consistently attend board meetings.

Four objectives of an advisory board are seen in the Rational Goal model as tasks that can be accomplished largely with internal board planning and resources. These are input to curriculum, support for ABET accreditation, program and student support, and internal fundraising. To effectively accomplish these objectives, here are some considerations which show positive correlation to effectiveness:

- Formal procedures for board involvement in the ABET accreditation process of which board members are aware.
- Engagement of board members with students in activities such as panels and forums, interviews, design projects, and social events.

The remaining four objectives of an advisory board are considered part of the Open Systems model, as they involve interaction of the board with the surrounding community. These are program health and development, program advocacy, external

fundraising and research support. Board characteristics which support these objectives are as follows:

- Coordination of advisory board activity and priorities with the college and university.
- Board membership with close ties to the school who are motivated to be advocates for the program.

9.6 Research Limitations

The advisory board model developed in this process provides a framework for viewing the effectiveness, operation, and member selection of engineering advisory boards. The model should be viewed as illustrating overall operation of the board from a qualitative perspective rather than as a quantitative model. The model should be thought of as a general depiction of advisory board operation and not be considered a strict representation of the input / output relationships. Elements that appear as inputs in one context might be better viewed as outputs in another, and there are complex interactions involved in many of the elements.

This survey cannot claim to be a representative sample of engineering school directors or board members as there was a high degree of self-selection involved in the survey responses. Directors who responded to the survey most probably had a stronger interest in the advisory board process than those who chose not to respond, and so were also more likely to have placed a higher priority on advisory board activity within their school. Board members who chose to respond to this survey were likely to be more engaged and supportive of the advisory board process than the typical advisory board member. The result is a likely bias towards more a more positive assessment of advisory board effectiveness. While this bias does not invalidate the correlations seen in the research and reflected in the effectiveness model between board operating variables and

effectiveness, it is possible that potential problems or issues with advisory boards were under-represented and may have been missed in the analysis.

The survey had a reasonable response rate overall but responses received from advisory board members represented only nine different engineering programs. Two programs represented eighteen of the forty-seven responses. The relatively small number of programs represented in board member responses means that caution must be exercised in generalizing board member responses as representing all engineering programs. There were also too few programs represented to do significant paired comparisons of board member and school leadership responses within the same program. The study was able to draw the conclusion that program directors and board members had differing views on some aspects of board operation, but was not able to pursue the extent or reason for those differences comprehensively or qualitatively.

9.7 Further Study

As mentioned in the discussion of research limitations, the survey had a high degree of self-selection in terms of respondents. A more representative sampling approach would produce results that could be stated with higher confidence as representing advisory board operation in general. While it is not immediately apparent how this kind of survey sampling could be achieved, this is an area of potential enhancement of this research. Enlistment of the help of professional organizations of which directors are members and visibility to this research at conferences attended by engineering educators might be of value in getting a broader response to the survey.

Also discussed earlier was the concern over the relatively small number of programs represented in board member responses. Having a substantive number of board member responses along with director input from a larger number of programs would allow systematic investigation of the differences in perspective between school leadership and board members. The limited data available pointed to the possibility of poor correlation in the assessment of effectiveness between directors and board members within the same program, and this would benefit from further investigation. There are indications that some of the significant issues that can affect board performance are associated with disconnects in perspective between directors and board members, and additional data could help confirm and describe this issue. Obtaining additional board member data is a challenge, as directors serving as gatekeepers must first be persuaded to allow access to their board members and forward the survey or provide contact information, and busy professionals serving as board members must be motivated to complete the survey.

One engineering college in particular, contacted only through director emails, had a high response rate from board members to the survey. Ten board member responses were received from one school of engineering, and five from another at this same institution. It would be instructive to understand why this program had such a uniquely high response rate from board members. The only other program with similar board member participation was one that the researcher was associated with and was able to personally request assistance from board members. As these two programs also gave very positive assessments of board effectiveness, they could lend themselves to another case study of board effectiveness. This case study would be particularly instructive in

that these two programs indicated that fundraising was not considered one of the board objectives, in contrast to the case study in this research in which it was a priority.

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APPENDIX A: INSTITUTIONAL REVIEW BOARD APPROVAL (INTERVIEWS)



The University of Oklahoma

OFFICE FOR HUMAN PARTICIPANT PROTECTION

IRB Number: 11606
Approval Date: February 12, 2007

February 12, 2007

Stephen Genheimer, M.S.
Industrial Engineering
202 W. Boyd Street, CEC 124
Norman, OK 73019

RE: The Effectiveness of Industry Advisory Boards in Engineering Education

Dear Mr. Genheimer:

On behalf of the Institutional Review Board (IRB), I have reviewed and granted expedited approval of the above-referenced research study. This study meets the criteria for expedited approval category 7. It is my judgment as Chairperson of the IRB that the rights and welfare of individuals who may be asked to participate in this study will be respected; that the proposed research, including the process of obtaining informed consent, will be conducted in a manner consistent with the requirements of 45 CFR 46 as amended; and that the research involves no more than minimal risk to participants.

This letter documents approval to conduct the research as described:

Survey Instrument Dated: February 06, 2007 Questions for Board Members
Survey Instrument Dated: February 06, 2007 Questions for Dept. Director
Other Dated: February 06, 2007 Recruitment e-mail
Survey Instrument Dated: February 06, 2007 All participants
Consent form - Other Dated: February 06, 2007 Information sheet
Protocol Dated: February 06, 2007
IRB Application Dated: February 06, 2007

As principal investigator of this protocol, it is your responsibility to make sure that this study is conducted as approved. Any modifications to the protocol or consent form, initiated by you or by the sponsor, will require prior approval, which you may request by completing a protocol modification form. All study records, including copies of signed consent forms, must be retained for three (3) years after termination of the study.

The approval granted expires on February 11, 2008. Should you wish to maintain this protocol in an active status beyond that date, you will need to provide the IRB with an IRB Application for Continuing Review (Progress Report) summarizing study results to date. The IRB will request an IRB Application for Continuing Review from you approximately two months before the anniversary date of your current approval.

If you have questions about these procedures, or need any additional assistance from the IRB, please call the IRB office at (405) 325-8110 or send an email to irb@ou.edu.

Cordially,

A handwritten signature in black ink, appearing to read "Lynn Devenport".

Lynn Devenport, Ph.D.
Vice Chair, Institutional Review Board

Ltr_Prot_Fappv_Exp

660 Parrington Oval, Suite 316, Norman, Oklahoma, 73019-3085 PHONE: (405) 325-8110 FAX (405) 325-2373

INFORMED CONSENT TO PARTICIPATE IN A RESEARCH STUDY

PROJECT TITLE: Effectiveness of Industry Advisory Boards in Engineering Education
PRINCIPAL INVESTIGATOR: Steve Genheimer
CONTACT INFORMATION: 1000 E. Whispering Oak Terrace, Mustang, OK 73064
405-376-5661 sgenheimer@cox.net

You are being asked to volunteer for a research study. You were selected as a possible participant because you a school director or development office official for a University of Oklahoma engineering program. Please read this form and ask any questions that you may have before agreeing to take part in this study.

Purpose of the Research Study

The purpose of this study is to review the operation of industry advisory boards (IAB's) in engineering education and answer the following questions:

- How is the effectiveness of an industry advisory board defined?
- How might the effectiveness be measured?
- What are the key elements that contribute to a board being effective?

At this early stage of the study, the goal is to help refine these questions and determine how the research can be structured to be of most value.

Procedures

If you agree to be in this study, you will be asked to do the following:

- Participate in a 30 to 45 minute interview with the researcher, in person or via telephone, at a location and time that is of your convenience.
- The interview will explore your involvement in the industry advisor board process, and your opinions on the topic of advisory board effectiveness.

Risks and Benefits of Being in the Study

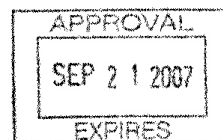
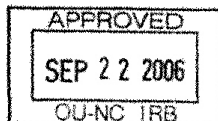
The study is believed to have no risks to you personally. All conversation will be kept confidential and no participants will be individually identifiable in the final publication.

The benefits to participation are access to the completed results of the study, which is anticipated to provide information that will assist engineering programs in having a more effective advisory board program.

Compensation

There will no monetary compensation for your involvement in this study.

OUNCIRB-ICF
05172005



Page 1 of 2

Voluntary Nature of the Study

Participation in this study is voluntary. Your decision whether or not to participate will not result in penalty or loss of benefits to which you are otherwise entitled. If you decide to participate, you are free to not answer any question or withdraw at any time.

Audio Taping Of Study Activities

To assist with accurate recording of participant responses, interviews may be recorded on an audio recording device. Participants have the right to refuse to allow such taping without penalty. Please select one of the following options.

- ☐ I consent to the use of audio recording.
☐ I do not consent to the use of audio recording.

Confidentiality

The records of this study will be kept private. In published reports, there will be no information included that will make it possible to identify any individual research participant. Any interview recording will be transcribed and the original recording erased. Research records will be stored securely in a locked file cabinet or in encrypted, password protected files. Individually identifiable records will be destroyed at the completion of the study (estimated December, 2007) and only approved researchers will have access to the records.

Contacts and Questions

The researcher conducting this study can be contacted at:

Researcher – Steve Genheimer
405-376-5661 sgenheimer@cox.net

Advisor – Dr. Randa Shehab
405-325-2307 rshehab@ou.edu

You are encouraged to contact the researcher if you have any questions.

If you have any questions about your rights as a research participant, you may contact the University of Oklahoma – Norman Campus Institutional Review Board (OU-NC IRB) at 405.325.8110 or irb@ou.edu.

You will be given a copy of this information to keep for your records. If you are not given a copy of this consent form, please request one.

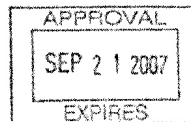
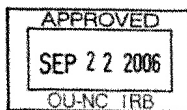
STATEMENT OF CONSENT

I have read the above information. I have asked questions and have received satisfactory answers. I consent to participate in the study.

Signature _____

Date _____

OUNCIRB-ICF
05172005



Page 2 of 2

INFORMED CONSENT TO PARTICIPATE IN A RESEARCH STUDY

PROJECT TITLE: Effectiveness of Industry Advisory Boards in Engineering Education
PRINCIPAL INVESTIGATOR: Steve Genheimer
CONTACT INFORMATION: 1000 E. Whispering Oak Terrace, Mustang, OK 73064
405-376-5661 sgenheimer@cox.net

You are being asked to volunteer for a research study. You were selected as a possible participant because you are a member of an Industry Advisory Board (IAB) for a University of Oklahoma engineering program. Please read this form and ask any questions that you may have before agreeing to take part in this study.

Purpose of the Research Study

The purpose of this study is to review the operation of industry advisory boards in engineering education and answer the following questions:

- How is the effectiveness of an industry advisory board defined?
- How might the effectiveness be measured?
- What are the key elements that contribute to a board being effective?

At this early stage of the study, the goal is to help refine these questions and determine how the research can be structured to be of most value.

Procedures

If you agree to be in this study, you will be asked to do the following:

- Participate in a 30 to 45 minute interview with the researcher, in person or via telephone, at a location and time that is of your convenience
- The interview will explore your involvement in the industry advisor board process, and your opinions on the topic of advisory board effectiveness.

Risks and Benefits of Being in the Study

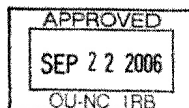
The study is believed to have no risks to you personally. All conversation will be kept confidential and no participants will be individually identifiable in the final publication.

The benefits to participation are access to the completed results of the study, which is anticipated to provide information that will assist individuals in being more effective in their role with an industry advisory board.

Compensation

There will no monetary compensation for your involvement in this study.

OUNCIRB-ICF
05172005



Page 1 of 2

Voluntary Nature of the Study

Participation in this study is voluntary. Your decision whether or not to participate will not result in penalty or loss of benefits to which you are otherwise entitled. If you decide to participate, you are free to not answer any question or withdraw at any time.

Audio Taping Of Study Activities

To assist with accurate recording of participant responses, interviews may be recorded on an audio recording device. Participants have the right to refuse to allow such taping without penalty. Please select one of the following options.

- ☐ I consent to the use of audio recording.
☐ I do not consent to the use of audio recording.

Confidentiality

The records of this study will be kept private. In published reports, there will be no information included that will make it possible to identify any individual research participant. Any interview recording will be transcribed and the original recording erased. Research records will be stored securely in a locked file cabinet or in encrypted, password protected files. Individually identifiable records will be destroyed at the completion of the study (estimated December, 2007) and only approved researchers will have access to the records.

Contacts and Questions

The researcher conducting this study can be contacted at:

Researcher – Steve Genheimer
405-376-5661 sgenheimer@cox.net

Advisor – Dr. Randa Shehab
405-325-2307 rlshehab@ou.edu

You are encouraged to contact the researcher if you have any questions.

If you have any questions about your rights as a research participant, you may contact the University of Oklahoma – Norman Campus Institutional Review Board (OU-NC IRB) at 405.325.8110 or irb@ou.edu.

You will be given a copy of this information to keep for your records. If you are not given a copy of this consent form, please request one.

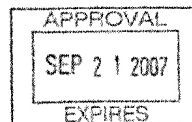
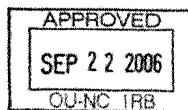
STATEMENT OF CONSENT

I have read the above information. I have asked questions and have received satisfactory answers. I consent to participate in the study.

Signature

Date

OUNCIRB-ICF
05172005



Page 2 of 2

APPENDIX B: INSTITUTIONAL REVIEW BOARD APPROVAL (SURVEYS)



The University of Oklahoma

OFFICE FOR HUMAN RESEARCH PARTICIPANT PROTECTION

IRB Number: 11446
Approval Date: September 22, 2006

September 22, 2006

Stephen Genheimer, M.S.
Industrial Engineering
202 W. Boyd Street, CEC 124
Norman, OK 73019

RE: The Effectiveness of Industry Advisory Boards in Engineering Education

Dear Mr. Genheimer:

On behalf of the Institutional Review Board (IRB), I have reviewed and granted expedited approval of the above-referenced research study. This study meets the criteria for expedited approval category 6, 7. It is my judgment as Chairperson of the IRB that the rights and welfare of individuals who may be asked to participate in this study will be respected; that the proposed research, including the process of obtaining informed consent, will be conducted in a manner consistent with the requirements of 45 CFR 46 as amended; and that the research involves no more than minimal risk to participants.

This letter documents approval to conduct the research as described:

Letter Dated: September 21, 2006 Letter of Support from Interim Director
Other Dated: September 19, 2006 Debriefing script
Protocol Dated: September 19, 2006 Summary of Study Activities
Consent form - Subject Dated: September 19, 2006
Other Dated: September 19, 2006 Engineering School Director Recruitment Email
Other Dated: September 18, 2006 Participant Identification Coding Scheme
Survey Instrument Dated: September 18, 2006 Advisory Board Chairman/Member Interview Protocol
Other Dated: September 18, 2006 Industrial Advisory Board Member Recruitment Email
Survey Instrument Dated: September 18, 2006 Engineering School Director Interview Protocol

As principal investigator of this protocol, it is your responsibility to make sure that this study is conducted as approved. Any modifications to the protocol or consent form, initiated by you or by the sponsor, will require prior approval, which you may request by completing a protocol modification form. All study records, including copies of signed consent forms, must be retained for three (3) years after termination of the study.

The approval granted expires on September 21, 2007. Should you wish to maintain this protocol in an active status beyond that date, you will need to provide the IRB with an IRB Application for Continuing Review (Progress Report) summarizing study results to date. The IRB will request an IRB Application for Continuing Review from you approximately two months before the anniversary date of your current approval.

If you have questions about these procedures, or need any additional assistance from the IRB, please call the IRB office at (405) 325-8110 or send an email to irb@ou.edu.

Cordially,

A handwritten signature in black ink, appearing to read "Lynn Devenport".
Lynn Devenport, Ph.D.
Vice Chair, Institutional Review Board

Survey - Advisory Board Effectiveness

Page 1 of 10

The Effectiveness of Industry Advisory Boards

Please read the following and indicate your agreement below in order to complete this survey. You are being asked to participate in this survey as part of a PhD research study being conducted at the University of Oklahoma, School of Industrial Engineering. You were selected as a possible participant because you are an engineering school director, advisory board member or are in some other way associated with an engineering education advisory board.

Purpose of the Research Study

Most university engineering programs have an industry advisory board or otherwise named group of individuals who assist the program on a voluntary basis. The goal of this research is to identify the key elements of structure and relationship which influence the effectiveness of the advisory board.

Procedure

This survey should take between 10 and 15 minutes to complete. You may only complete this survey one time, but you may leave the survey at any time and return to complete it later. You will be asked to identify your role in the advisory board process, and the list of questions will be different depending on what your role is.

Voluntary and Confidential Nature of the Study

Participation in this study is voluntary and you are free to withdraw at any time. All responses are anonymous, will be kept confidential with the researcher and will not be shared with any school official. In published reports, there will be no information included that will make it possible to identify any specific research participant or institution.

Survey Results

When you finish taking the survey, you will be given the opportunity to request a summary of the study results once the research is complete.

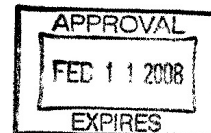
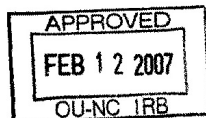
Contacts and Questions

The researcher conducting this study can be contacted via email at genheimer@ou.edu. You are encouraged to contact the researcher if you have any questions. If you have any questions about your rights as a participant in this research, you may contact the University of Oklahoma - Norman Campus Institutional Review Board (OU-NC IRB) at 405-325-8110 or irb@ou.edu.

Informed Consent

1. Your participation in this survey indicates your informed consent.*

- ☒ I would like to continue with the survey
☐ I do not wish to participate at this time



APPENDIX C: SURVEY INSTRUMENT

Survey - Advisory Board Effectiveness

Page 1 of 10

The Effectiveness of Industry Advisory Boards

Please read the following and indicate your agreement below in order to complete this survey. You are being asked to participate in this survey as part of a PhD research study being conducted at the University of Oklahoma, School of Industrial Engineering. You were selected as a possible participant because you are an engineering school director, advisory board member or are in some other way associated with an engineering education advisory board.

Purpose of the Research Study

Most university engineering programs have an industry advisory board or otherwise named group of individuals who assist the program on a voluntary basis. The goal of this research is to identify the key elements of structure and relationship which influence the effectiveness of the advisory board.

Procedure

This survey should take between 10 and 15 minutes to complete. You may only complete this survey one time, but you may leave the survey at any time and return to complete it later. You will be asked to identify your role in the advisory board process, and the list of questions will be different depending on what your role is.

Voluntary and Confidential Nature of the Study

Participation in this study is voluntary and you are free to withdraw at any time. All responses are anonymous, will be kept confidential with the researcher and will not be shared with any school official. In published reports, there will be no information included that will make it possible to identify any specific research participant or institution.

Survey Results

When you finish taking the survey, you will be given the opportunity to request a summary of the study results once the research is complete.

Contacts and Questions

The researcher conducting this study can be contacted via email at genheimer@ou.edu. You are encouraged to contact the researcher if you have any questions. If you have any questions about your rights as a participant in this research, you may contact the University of Oklahoma – Norman Campus Institutional Review Board (OU-NC IRB) at 405-325-8110 or irb@ou.edu.

Informed Consent

1. Your participation in this survey indicates your informed consent.*

- ☐ I would like to continue with the survey
- ☐ I do not wish to participate at this time

Next

Cancel

Respondent Information

2. Which role best describes your involvement with your advisory board (check one):*

- ☒ Board member
- ☐ Board chair or former board chair
- ☐ Other board officer or former officer
- ☐ Department / school director or former director
- ☐ Faculty Member

3. Which title best describes the engineering program supported by this board?

- ☐ Civil Engineering
- ☐ Chemical Engineering
- ☐ Computer Science
- ☐ Electrical Engineering / Computer Engineering
- ☐ General Engineering
- ☐ Industrial Engineering
- ☐ Mechanical Engineering
- ☐ Other, please specify

4. Indicate the name of the university or educational institution
(Required in order to be able to aggregate responses from each program. Confidential with the researcher and will not be identified in any research publication.)

Back

Next

Cancel

Survey - Advisory Board Effectiveness

Page 3 of 10

Advisory Board Objectives

5.1 For each of the possible objectives of a program advisory board listed below, please indicate, in your opinion, how important that objective is to your program

	1 Completely unimportant	2	3	4	5 Extremely important	Don't know
Advise program on curriculum content to meet industry needs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Provide input on program health and development opportunities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assist with seminars, design projects, graduate placement, mentoring, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Provide input and feedback to help meet ABET accreditation criteria	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Serve as an advocate for the program with administration, community, industry, alumni, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Raise funds for school use from board members personal resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use board contacts and influence to raise funds from other sources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Help promote and coordinate research opportunities with industry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5.2 For the same set of the possible objectives, please indicate, in your opinion, how effective your program is in accomplishing those objectives.

	1 Completely ineffective	2	3	4	5 Extremely effective	Don't know / not applicable
Advise program on curriculum content to meet industry needs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Provide input on program health and development opportunities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assist with seminars, design projects, graduate placement, mentoring, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Provide input and feedback to help meet ABET accreditation criteria	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Serve as an advocate for the program with administration, community, industry, alumni, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Raise funds for school use from board members personal resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use board contacts and influence to raise funds from other sources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Help promote and coordinate research opportunities with industry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5.3 Comments on advisory board objectives

Back

Next

Cancel

Advisory Board Culture and Effectiveness

6.1 Indicate the degree to which you agree or disagree with the following statements regarding the culture of the institution and effectiveness of your advisory board.

	1 Strongly disagree	2	3	4	5 Strongly agree	No opinion
Graduates of this university are generally very loyal and maintain close ties to the institution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The engineering school supported by this advisory board maintains a strong, healthy program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The advisory board adds significant value to the educational program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There is open and honest communication between the engineering school and the advisory board	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The school gives serious consideration to input from the advisory board	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6.2 Overall effectiveness

	1 Completely ineffective	2	3	4	5 Extremely effective
Overall, how effective has the advisory board been in accomplishing its objectives?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6.3 Comments on the overall effectiveness of the board

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Advisory Board Operation and Member Selection

7.1 Indicate the degree to which you agree or disagree with the following statements regarding the operation of your advisory board

	1 Strongly disagree	2	3	4	5 Strongly agree	No opinion
There are clear objectives and the mission of the board is well understood	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advisory board meetings are well run and time is well spent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The advisory board process is well documented (agendas, minutes, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advisory board members get along well with each other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Efforts are made to encourage socialization among board members and with faculty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The faculty is engaged and supportive of the advisory board process	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There is a wide range of age, culture, background and industry experience represented on the board	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Operation of this advisory board is well coordinated with the rest of the college or university	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Data from the advisory board play an important role in ABET accreditation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The role of the advisory board chair is critical in board operation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The advisory board chair is effective in leadership of the board	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The role of the department director (engineering school head) is critical in board operation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The department director (engineering school head) is effective in directing board activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7.2 In what way are input and data from the advisory board used in the ABET accreditation process?

- ☐ Not at all
☐ Informally
☐ Formally
☐ Don't know
☐ Other, please specify

7.3 In what ways does the advisory board regularly engage with students? (Check all that apply)

- ☐ No regular engagement
☐ Formal student interviews
☐ Involvement with design projects
☐ Guest lecturing
☐ Panels or other student forums
☐ Social engagements (banquets, etc.)
☐ Personal mentoring
☐ Other, please specify

7.4 Tactical versus strategic focus

	1 Entirely tactical	2	3	4	5 Entirely strategic
In your opinion, how should the engagement between the advisory board and the program be characterized?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In your opinion, how is the engagement actually characterized?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7.5 Indicate, in your opinion, how important each of the following characteristics are when selecting an advisory board member.

	1 Completely unimportant	2	3	4	5 Extremely important
Personality and "fit" with director, faculty and present board members	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Personally known and recommended by faculty or other board members	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Strong desire to be involved with and support the program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Close ties and ongoing relationship with the school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recognition for past contribution to the school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Brings leadership or other needed skills for internal board operation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Work experience or expertise in a relevant engineering or educational field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Association with a company that is a potential employer of program graduates	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Senior leadership status and influence in industry, government, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Promote relationship with a strategic company, government or other organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Individual net worth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Availability (time, proximity to school, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Diversity (industry, age, gender, race, etc.) to help round out the board	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7.6 For the same set of characteristics, indicate, in your opinion, how successful the board has been in obtaining sufficient representation of members with this characteristic.

	1 Completely unsuccessful	2	3	4	5 Extremely successful	Don't know
Personality and "fit" with director, faculty and present board members	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Personally known and recommended by faculty or other board members	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Strong desire to be involved with and support the program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Close ties and ongoing relationship with the school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recognition for past contribution to the school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Brings leadership or other needed skills for internal board operation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Work experience or expertise in a relevant engineering or educational field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Association with a company that is a potential employer of program graduates	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Senior leadership status and influence in industry, government, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Promote relationship with a strategic company, government or other organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Individual net worth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Availability (time, proximity to school, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Diversity (industry, age, gender, race, etc.) to help round out the board	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7.7 Comments on advisory board operation and member selection

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Board Operation - Questions for Dept. Director

8.1 As department director, do you have the primary liaison responsibility with the advisory board?

- ☐ Yes, coordination is my responsibility
☐ No, someone else coordinates most of the activity
☐ If someone else is the primary liaison, please indicate who that individual is

8.2 How long have you been in the position of department director?

- ☐ <1 year ☐ 1-2 years ☐ 2-5 years ☐ 5-10 years ☐ >10 years

8.3 How often does the advisory board meet?

- ☐ More than twice annually ☐ Twice annually ☐ Once annually ☐ Less than once annually ☐ Irregularly

☐ Other, please specify

8.4 How long do board meetings last?

- ☐ Less than 4 hours ☐ Less than one full day ☐ One full day ☐ More than one day
☐ Other, please specify

8.5 How large is the membership of the advisory board

- ☐ <8 ☐ 8-10 ☐ 11-15 ☐ 16-20 ☐ 21-25 ☐ 26-30 ☐ >30

8.6 What fraction of board members attend a typical board meeting?

- ☐ <25% ☐ 25-40% ☐ 40-60% ☐ 60-75% ☐ 75-90% ☐ >90%

8.7 How long has the advisory board been in existence?

- ☐ <2 years ☐ 2-5 years ☐ 5-10 years ☐ 10-20 years ☐ >20 years ☐ Don't know

8.8 Does the board have active subcommittees?

- ☐ Yes ☐ No

8.9 Please indicate which subcommittees are active, if applicable

- ☐ Finance
☐ Membership
☐ Curriculum / Academics
☐ Accreditation
☐ Other, please specify

8.10 Approximately what percentage of board members are graduates or alumni of the school?

- ☐ <20% ☐ 20-40% ☐ 40-60% ☐ 60-80% ☐ 80-99% ☐ 100%

8.11 What is the length of service term for a board member?

- ☐ Undefined
- ☐ 1 year
- ☐ 2 years
- ☐ 3 years
- ☐ >3 years
- ☐ Unlimited
- ☐ Don't know

8.12 Is the term of a board member renewable?

- ☐ Yes - a limited number of terms
- ☐ Yes - an unlimited number of terms
- ☐ No
- ☐ Undefined
- ☐ Don't know / not applicable

8.13 Which of the following are formally documented regarding board operation:

- ☐ Board charter / mission statement
- ☐ Board operation / bylaws
- ☐ Other, please specify

8.14 Is there an orientation procedure for new board members?

- ☐ Formal
- ☐ Informal
- ☐ None

8.16 Indicate the degree to which you agree or disagree with the following statements regarding the operation of your advisory board

	1 Strongly disagree	2	3	4	5 Strongly agree	No opinion
Board members actively support and are involved in the program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel comfortable in my role coordinating the work of the advisory board	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8.17 Comments on advisory board organization and operation

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Board Operation - Questions for Board Members

9.1 Indicate the degree to which you agree or disagree with the following statements regarding the operation of your advisory board

	1 Strongly disagree	2	3	4	5 Strongly agree	No opinion
I attend all of the advisory board meetings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that my time spent on advisory board activity is worthwhile	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I look forward to and enjoy participation in board meetings and board activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My participation in the advisory board process benefits me and / or my company	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am involved outside the board meetings in volunteer activity with the program and / or students	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The program is clear and up front regarding expectations about financial contribution from board members	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am comfortable with the priority and attention given to fundraising by the board	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The board is given candid and complete information regarding the state of the educational program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The school follows up on actions from the advisory board meetings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have strong ties to the school and maintain a close relationship	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9.2 Comments regarding advisory board operation

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Board Demographics - Questions for Board Members

10.1 What is your age?

- ☐ <25 ☐ 25-35 ☐ 35-45 ☐ 45-55 ☐ 55-65 ☐ 65-75 ☐ >75

10.2 What is your gender?

- ☐ Male ☐ Female

10.3 Do you consider yourself a racial / ethnic minority?

- ☐ Yes ☐ No

10.4 What is the highest level of education you have completed?

- ☐ Not a college graduate
☐ Bachelors degree
☐ Some study beyond bachelors
☐ Masters degree
☐ Some study beyond masters
☐ Doctorate

10.5 Which best describes the field in which you have spent the largest part of your career?

- ☐ Manufacturing
☐ Business
☐ Education
☐ Government / Military
☐ Energy
☐ Health
☐ Services
☐ Communications
☐ Construction
☐ Finance
☐ Other, please specify

10.6 Which best describes the most senior position you have held in your career?

- ☐ Individual contributor
☐ Manager
☐ Senior Manager / Director
☐ Executive
☐ Chief Executive
☐ Founder
☐ Owner
☐ Other, please specify

10.7 What best describes your current career status?

- ☐ Full time ☐ Part time ☐ Retired

10.8 How related is / was your primary career field to the engineering discipline of the program your advisory board is associated with?

- ☐ Closely related ☐ Somewhat related ☐ Not related

10.9 Indicate your approximate net worth

- ☐ <\$100K ☐ \$100K-\$500K ☐ \$500K-\$2M ☐ \$2M-\$5M ☐ >\$5M

10.10 How much money in total have you contributed to this engineering program?

- ☐ None ☐ \$1-\$1K ☐ \$1K-\$10K ☐ \$10K-\$100K ☐ >\$100K

10.11 Indicate your relationship to the educational program

- ☐ Graduate / alumnus of this board's engineering program
☐ Graduate / alumnus of another engineering program at this university
☐ Graduate / alumnus of a non-engineering program at this university
☐ Not a graduate / alumnus of this university

10.12 How long have you served on the advisory board?

- ☐ < 1 year ☐ 1-2 years ☐ 2-5 years ☐ 5-10 years ☐ 10-15 years ☐ >15 years

10.13 How far do you have to travel to attend board meetings?

- ☐ <40 miles ☐ 40-80 miles ☐ 80-200 miles ☐ 200-500 miles ☐ >500 miles

10.14 Who pays travel expenses for your participation in board activities?

- ☐ I have no travel expenses
☐ I pay my own expenses
☐ My company pays the expenses
☐ The school pays the expenses
☐ Other, please specify

10.15 Comments on advisory board demographics

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Survey - Advisory Board Effectiveness

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Final comments

11.1 In your opinion, what are the strongest aspects of this advisory board?

11.2 In your opinion, what are the most significant weaknesses of the advisory board or limitations to its effectiveness?

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APPENDIX D: SURVEY RECRUITMENT E-MAIL

Dr. _____,

Industry advisory boards are playing an increasingly important role in university engineering education programs, but there has been little comprehensive research into what makes some of these programs more effective than others. As a part of PhD research at the University of Oklahoma on this topic, we would like to request your assistance in completing a survey regarding the operation of the advisory board that serves your engineering program.

Would you please consider:

- Completing a brief survey regarding your perceptions and the operation of your advisory board.
- Asking members of your advisory board and faculty who are involved in the advisory board process to take this survey, by forwarding this request.

The survey can be found on line at the link shown below, and should take between 10 and 15 minutes to complete. The individual survey responses will be kept confidential by the researcher, and no individual institutions will be identified in the final publication. Following completion of the survey, an opportunity will be given to request a summary of the findings and conclusions of the study once the research is completed.

If there any questions, please contact the researcher via e-mail.

Steve Genheimer at genheimer@ou.edu

Click the following link to take the survey [SURVEY](#) or if you are not taken directly to the survey, copy and paste this web address into your browser:

<http://elearning.ou.edu/itsurvey/TakeSurvey.asp?SurveyID=6J2953112nmMG>

Thank you for your assistance.

Steve Genheimer

Adjunct Instructor, PhD candidate, University of Oklahoma School of Industrial Engineering
Vice President of Engineering, Seagate Technology (retired)

APPENDIX E: FRONTIERS IN EDUCATION CONFERENCE PAPER

*The following paper, based on this research, was accepted for presentation at the
2007 Frontiers in Education conference, October 10 -13 in Milwaukee, WI.*

The Effective Industry Advisory Board in Engineering Education - A Model and Case Study

Stephen R. Genheimer

PhD Candidate, University of Oklahoma, School of Industrial Engineering

Dr. Randa Shehab

Associate Professor, University of Oklahoma, School of Industrial Engineering

Abstract - The use of voluntary advisory boards to give aid and advice is almost universal in engineering education programs. As part of a larger study on the effectiveness of industry advisory boards, a model of advisory board effectiveness was developed based on the literature on organizational effectiveness. This model incorporates four dimensions of board structure and operation: human relations, internal processes, rational goals, and open systems. A case study based on observations and interviews was conducted in an engineering school whose advisory board relationship was highly regarded. The case study examined board objectives, makeup, and overall effectiveness. The board was seen as highly engaged and effective, and has made significant contributions in curriculum and financial development and in overall support of the program. The case study traced current effectiveness back to a transition in board operation which occurred several years ago. Strong school leadership who believe in the advisory board process, senior board membership with a commitment to the program, a process in which advisory board input is taken seriously, and explicit and well focused fund raising expectations were seen as key components of this effective advisory board relationship.

Index Terms – ABET accreditation, Advisory boards, Fund raising, Industry relationship, Organizational effectiveness

INTRODUCTION

The use of voluntary advisory boards to give aid and advice to an educational program is common across most university academic divisions, regardless of their field of study. The vast majority of universities offering accredited degree programs in engineering have established some form of advisory structure composed of practicing or retired professionals who are called upon to help support the educational program in various ways. This structure is referred to in a number of ways, including “board”, “council” or “committee”, and the members may be called “advisors”, “visitors” or “associates.” This paper will use the general term “Industry Advisory Board” (IAB).

While the use of advisory boards to support engineering educational programs is common, there is relatively little written and no known comprehensive research on what it takes to establish and operate an effective advisory program. D.M.

Rooney notes, “There has yet to accrue any significant database of literature focusing on the type and level of interaction currently obtained between IABs and the programs they advise” [1]. The makeup, goals, and operation of advisory boards have significant variation across programs. Some schools seem to have established valued and effective advisory boards, with excellent working relationships with the program. Other boards could be described as perfunctory, non-functional or dysfunctional. Yet other programs may find that some aspects of the advisory board relationship are working well, while other aspects are ineffective.

This paper is part of a larger study on the effectiveness of industry advisory boards in engineering education. In this study, a model of board effectiveness was developed based on organizational effectiveness literature. To guide this research, interviews of board members and institutional leadership were conducted and board meeting operations were observed. A large scale survey of board operation and effectiveness was initiated. This report summarizes the effectiveness model that was developed and describes a case study of a board that was judged as highly effective.

INDUSTRY ADVISORY BOARDS IN ENGINEERING EDUCATION

The consensus of the literature on engineering advisory boards is that “an appropriately organized, charged, and managed board can be a major asset to a progressive and dynamic department” [2]. There are several objectives which an advisory board may be asked or expected to accomplish in its relationship with the academic program, and each engineering institution is likely to have its own priorities and goals. It is important to note at the outset that a key word in the title of these boards is “advisory”. While they can provide essential input and assistance to a program, their primary role is advice and not governance.

The historical role and most often stated purpose for the creation of IABs is to give the program visibility to the trends and needs of industry and help ensure that curriculum is current, relevant, and in line with the demands of the workplace [3, 4]. Clearly a priority for many programs is that the advisory board assist the department in fund raising, either through direct contributions by board members, or through their influence with industry and in the community. This expectation is often implied rather than explicitly stated [5].

The introduction of the ABET EC2000 accreditation process has caused many schools to initiate or revitalize advisory board programs [6]. Advisory boards can play an important role in helping satisfy the requirement for assessment of program educational objectives (EC 2000 criterion 2) and program outcomes and assessment (EC 2000 criterion 3). Input from the advisory board can help document the needs of some of the program constituents [7], and also help provide assessment of how well the program is meeting its objectives. Ongoing documented feedback from the board on the operation of the program can be a key ingredient in the continuous process improvement expected by ABET [8].

There are other objectives of advisory boards described in the literature and observed first hand in board operation. One objective is to provide support and serve as a resource for the program and its students, using board member position, expertise and experience. Board members may assist in such areas as student mentoring, internships and hiring, participation in capstone design projects, lecturing in classes, etc. Another is to serve as an advocate for the program and its objectives, including helping the program recruit new students, representing the program with industry, and helping keep the needs and the priorities of the program visible to university administration. Institutions may ask for the board's tactical and strategic input on the health and direction of the school, including development of new programs and involvement in the selection of faculty and school leadership.

AN ADVISORY BOARD EFFECTIVENESS MODEL

The literature on the topic of educational advisory boards generally comes from a practical, experiential perspective and there is little reference to underlying principles and theories of organizational effectiveness. There has been much research and writing on the topic of organizational effectiveness, and one of the goals of this study was to see if a model of industry advisory board effectiveness in engineering education could be developed from the literature on organizational effectiveness.

While effectiveness is clearly a central concept in organizational theory and analysis, the literature shows a notable lack of consensus on the definition, measurement, and modeling of organizational effectiveness. J. E. Sowa, S. C. Selden, and J. R. Sandfort observe that "Organizational effectiveness research is beset with controversy, including debates about the primary factors that constitute organizational effectiveness" [9]. In the study of organizational effectiveness, there cannot be a universal model linking input variables with overall effectiveness, because the definition of effectiveness continually changes [10]. The primary reason for this, a number of scholars argue, is that effectiveness is not a concept, but a construct – a high level abstraction composed of concepts at lower levels of abstraction [11-13]. This means that any study of organizational effectiveness must focus on the components that make up effectiveness, which may be different depending on the organizational structure, goals, and culture [14]. J.P. Campbell describes the challenge: "To ask a question about whether an organization is effective or

ineffective is virtually useless. Effectiveness is not one thing. An organization can be effective or ineffective on a number of different facets that may be relatively independent of one another" [12].

With these considerations in mind, various approaches to organizational effectiveness modeling in the literature were examined to determine if a model could be developed for use with advisory boards which took into account this construct nature of effectiveness. R. E. Quinn and J. Rohrbaugh proposed a multi-dimensional approach to effectiveness which recognized the existence of competing values within the construct space (figure 1 [13]). They grouped effectiveness along two orthogonal axes. The first axis describes control versus flexibility, or high control versus low control, respectively. This axis recognizes that some of the aspects that influence accomplishment are well within the planning and control of the organization. Other aspects are not, and require flexibility and the ability to adapt. The second axis describes internal versus external emphasis. Some of an

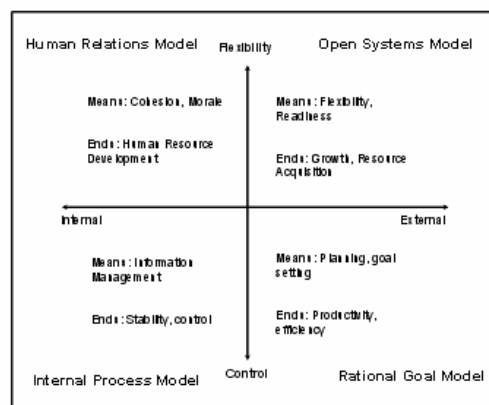


FIGURE 1
QUINN AND ROHRBAUGH ORGANIZATIONAL EFFECTIVENESS MODEL

organization's activities and measures of accomplishment are purely internal, serving the internal processes and needs of the organization, while others are driven by requirements of and interaction with external constituents. These two axes define four quadrants or dimensions of effectiveness, with opposing quadrants in some degree of tension. Each quadrant, or model, describes both means (inputs) and ends (outputs) with which the model is concerned.

With the Quinn and Rohrbaugh perspective as a basis, a model of advisory board effectiveness was formulated (figure 2). At the heart are the four models or dimensions of organizational effectiveness. These are Human Relations, Internal Process, Rational Goal and Open Systems. Each of these models has outputs, or measurable accomplishments, that contribute to the overall effectiveness of an advisory board. Each model has inputs or factors that significantly

affect operation of the board in that dimension, and each model has different attributes that are valued in the selection of board members.

The **Human Relations** model falls in the quadrant of internal focus and low control. In this view, interpersonal relationships within the board play a key role in influencing board effectiveness, and there is a recognition that human dynamics are difficult to predict and control. This model values group cohesion and morale, and a board that is effective in this area will have members who get along well with each other, feel personal satisfaction and significance because of their involvement, and feel that their individual contributions are valued. In this perspective, board members are likely to be selected because of personal connections with the school and other board members or administration, with strong consideration to how well they will fit in with the rest of the board, administration, and faculty.

The **Internal Process** model has internal focus and high control. Attention here is given to the processes and systems within the board that keep it operating smoothly on an ongoing basis. Outputs of interest are seen as a direct result of the organizational processes in operation. Meetings are well organized, with agendas set ahead of time and followed, and the activities and actions of the group are well documented.

Charters or other appropriate documents clearly spell out the objectives, roles, and responsibilities of the board. Leadership of the group is effective, and roles for members are well defined. Careful thought will be given to choosing members who have the time and availability to be actively involved in the board process, and consideration may be given to selecting members with specific leadership or organizational skills.

The **Rational Goal** model is concerned with objectives that the board can set and deliver primarily with internal board resources and effort. The focus is on external deliverables, but the level of control by the board is high. Here we start to see the board objectives mentioned earlier come into play. The experience and knowledge of the board members is called upon to provide input into curriculum, as well as providing input and doing interviews that contribute to the ABET assessment process. Fund raising from members' personal resources and the ability of members to contribute time and energy into assisting students and the program are considered in this model. This perspective seeks members who have personal resources, skills, and knowledge to contribute to the advisory board process.

The last model, **Open Systems**, deals with how the advisory board relates to the larger world of which it is a part. The focus is external, with the recognition that the board

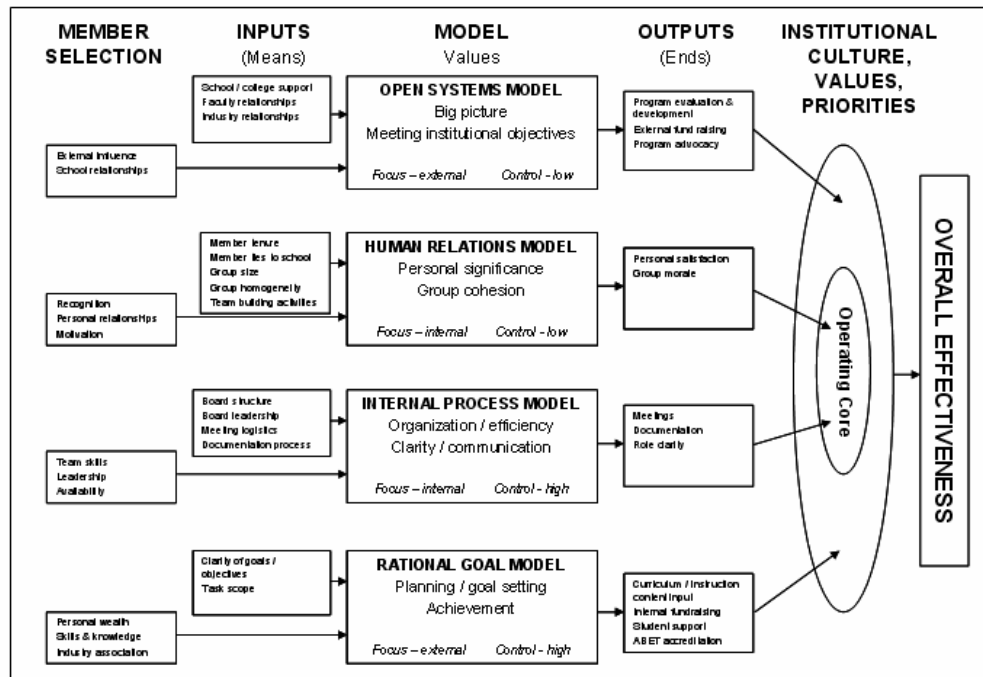


FIGURE 2
GENERAL MODEL OF INDUSTRY ADVISORY BOARD EFFECTIVENESS

functions in a larger systems environment over which it may have little control, both within the larger educational institution and the surrounding culture, industry and government. Fund raising in which board members use connections and influence outside the board falls in this dimension, as well as the use of the board as advocates for the program externally and as strategic advisors for the program. Board members are selected for their contacts and influence in the surrounding environment.

In total, this effectiveness construct postulates that in the truly effective board, the objectives of each model are given strong and balanced consideration. Members will be selected in such a way that the various needs of each aspect of board operation are satisfied. The human relations and internal process dimensions will create a solid operating core or foundation for the board, and the rational goal and open systems dimensions will support the external deliverables of the board. How each of these dimensions are integrated to shape the overall effectiveness of the organization will vary from board to board, depending on institutional culture, values, and priorities.

STUDYING ADVISORY BOARD EFFECTIVENESS

While this model of advisory board effectiveness is consistent with the literature on organizational effectiveness and engineering advisory board operation, more study was needed to examine its validity and value in the actual operation of advisory boards. Access was gained to two school-level advisory boards in the College of Engineering at a large public research institution in the south central region of the United States. Several board meetings were observed over a period of a year and a half. Board charters, agendas, and minutes were reviewed, and interviews were conducted with 15 individuals, including board members, current and former board chairs, current and former department directors, and the dean of the College of Engineering. The effectiveness model was used as an outline to structure the interviews and as a guide to categorizing the findings, and proved valuable and consistent from both perspectives.

In this observation and interview process, it became clear that one of the advisory boards being studied was viewed by all involved as particularly effective. In the interviews, all queried members of this board were enthusiastic about their participation, felt that the school valued their input, and that they were able to add significant value through the process. Those involved in the school administration were equally positive in their assessment of the board's contribution to the program. When asked to give a numerical rating for overall effectiveness of the board on a scale of 1 to 10, ratings were consistently in the 8 or 9 range. The latest ABET accreditation report cited the input and involvement of the advisory board as one of the program's strengths.

Of particular interest was the observation by many who had been involved in the program over an extended period of time that this had not always been the case for this board. In the period of time before the late 1990s, board operation was considered weak, with effectiveness ratings in the range of 2

to 4. This, of course, raised the question of what had changed in the board and its operation to result in such a significant turnaround in effectiveness. After studying this board, both in terms of current operation and from a historical perspective, it was felt that this board and its relationship with the school could serve as an excellent case study in the makeup and operation of an effective industry advisory board.

A CASE STUDY OF ADVISORY BOARD EFFECTIVENESS

Historical Perspective

The advisory board for this engineering program has been in existence for longer than anyone currently involved can remember, certainly over 20 years. Operation of the board in the late 1980s and early to mid 1990s was described by one board member as "perfunctory", and there was a period of a couple of years when the director of the school did not call board meetings at all. One member theorized *"I don't think that person wanted the advisory board involved because they might find out something, might say something about his performance."* Several individuals involved in the board at that time recalled that meetings consisted mostly of status reports from the school, and one said, *"Some people in that position want to tell you what they've done and use it as a 'how great I am' sounding speech ... if you go just listen to a report of how great we are, to my mind, I'm not interested in participating in it."* The program had experienced a high level of turnover in department leadership and was struggling with low enrollment. Board membership was small (seven or eight members), with significant longevity of service, and there was essentially no diversity on the board, though the student body was becoming increasingly diverse. Although board members had close ties to the school and were eager to be supportive, they were frustrated that they would give input at board meetings, and come back at subsequent meetings to see no action or follow up. *"You talked, but didn't ever see anything happen."*

A Transition in Board Effectiveness

In the late 1990s, a significant turnaround occurred in the operation and effectiveness of the board that was tied most closely to the arrival of a new school director. This individual had a combination of industry and academic experience, and had seen the value of advisory boards in the past, both as a board member and from the academic perspective. *"I came to this with a conviction that these advisory boards are important."* Faced with the challenge of revitalizing the program, he believed the advisory board was a resource that could be tapped to assist in the process. The new director teamed up with the chairman of the advisory board at that time, who had the trust and confidence of the board, and set about to deliberately make changes that would improve the effectiveness of the board.

The first task was to introduce some new blood into the board membership, individuals with a proven track record in industry and who the director knew could be counted on to bring fresh energy and perspective, and in the process

reenergize the existing membership. As the board chair at the time commented, *"We've got too many of us old guys on here."* As time went on, members were added with deliberate attention towards diversity - diversity of industry and career experience, diversity of gender and culture, and members who were not alumni of the university.

The board chair was a strong leader with broad experience in strategic planning, and he and the director began to make meetings well planned and purposeful, with a business-like feel and organization. One of the key messages conveyed to the board was that their input was sought and valued, and this was reinforced with a deliberate effort to make sure that input was acted upon and follow-up status was given at subsequent board meetings. The department director tasked the board with concrete actions, specifically chosen to be of significant value to the department while at the same time being within the scope of what volunteers could reasonably be expected to do. One of the tasks was to raise funds for an advisory board department scholarship, and the board responded willingly.

Current Perspectives on Effectiveness

Though the department director at the time of the transition is no longer in that role, subsequent directors have maintained and built upon the pattern of board operation that was established at that time. The college dean commented *"I think most people say that it is the most vigorous and effective of all of our boards in the college"*. Both school leadership and board membership see significant value added by the advisory board and are enthusiastic about their participation. In interviews, board members consistently commented on how the school asked for their input, took their recommendations seriously, and followed through on what they heard from the board. Members provided examples where the board was able to influence curriculum and program content, including increased preparation for students in the use of application software, increased emphasis on communication and presentation skills, computer aided design instruction, and the introduction of a joint engineering and business MBA program. A high percentage of board members attend each meeting, and in the words of one board member, *"It's pretty easy to attend the meetings when you feel like you're actually getting something done versus just going through the motions. I think that counts for why we've got pretty good attendance and pretty involved board members."* There is a feeling of growing trust and mutual respect between the school and the board, and a sense in which issues of a more strategic nature are increasingly being discussed with the board.

Advisory Board Priorities

There was general agreement from those interviewed that the top two objectives of the board are providing industry perspective and input to the academic program and helping the school by raising funds. Board members generally emphasized the importance of providing a link to industry. One member commented specifically, *"The main objective of the advisor board is to keep the school relevant to the needs of*

industry." School leadership, on the other hand, while recognizing the importance of this input, tended to be more appreciative of the ability of the board to provide discretionary funds to the school. *"They provide us flexible sources of money that we do not get from the state allocations."* Board members had a general understanding that the board played a role in the ABET accreditation process, particularly through interviewing current students and recent graduates to get their assessment of the program, but school leadership had more appreciation of the significance of this role - *"I don't really see how you could comply with ABET 2000 without these boards."* While there was evidence of the board's involvement in other ways (student support, program advocacy, and program evaluation and development), these did not seem to be as high a priority as curriculum input, fund raising and ABET support.

Fund Raising

A deliberate decision was made a few years ago by the board and school leadership to be very clear about expectations from board members in fund raising. The board charter was amended to read, *"Members are expected to provide an annual donation to the school"*. No amount is specified, but there is regular discussion at board meetings about the state of current fund raising activities and the extent of member participation. Major fund raising emphasis over the last several years has been directed towards providing student scholarships and facility renovation. In addition, the board has been supportive of college level capital fund raising campaigns. There did not seem to be any level of discomfort expressed by board members at this emphasis and expectation. There is recognition by school leadership that board members are much more responsive to appeals to fund specific projects within the school rather than general appeals for financial support. *"My sense is that board members don't like to give money to the general pool. They like to donate money to a very specific line item."* The program also appears to have been more successful in raising money directly from board members than in using potential board member influence and connections to appeal to others for funds.

Leadership

It appears clear from observation and interviews that strong school leadership is the most significant factor in board effectiveness. In the words of a long time board member, *"You know, the most important ... part of the board is the leader of the school. The way the department chooses to interact with and use the board is the critical factor, in my opinion. If that person doesn't want to use it, it doesn't happen. If that person doesn't know how to interact well, it doesn't happen as well."* A school director who is comfortable in that leadership position, respected by the faculty and advisory board, believes in the advisory process and makes it a priority, and who listens and seriously considers input from the advisory board is the most significant element in advisory board effectiveness. The school director sets the tone, determines the kind of people that are going to

be on the board, and sets the agenda for what topics the board will be engaged in. The advisory board chair is also an important role, as he/she serves as "cheerleader" and sets the example for the rest of the board to follow. A good working relationship and unity of purpose between the school director and the board chair is important to effective board operation.

Board Membership

Membership of this advisory board consists of up to 15 active members, and up to 10 senior active members (former members who wish to stay involved in a non-voting role). At a recent meeting, a decision was made to increase the active membership limit to 18 members. One of the key factors responsible for the effectiveness of this board is its makeup. It has a large base of senior executives, financially secure and proven as leaders, with strong ties to the school and profession, and a desire to "give back" to the school and community. The business segments and industries represented are diverse, from manufacturing to law, and from government to entrepreneurship. To this base were added some younger members who give a career perspective closer to that of a young college graduate, and who bring the energy and enthusiasm of youth. The key ingredients looked for in all members are that "they have a deep caring for the profession and for this institution" and that they "have the time and interest to support the department." Rather than identify companies or industry segments and ask for representatives, the school has looked for individuals who bring the right experience and interest to the process. Potential members are identified through personal connections with school leadership, faculty, and existing board members. As the dean of the college observed, "This is a people business, and nothing you can do in structure or policy will substitute for the right people. So if the board is not functional, it's probably because the department head of that department is not effectively utilizing it, or they have just got the wrong people on the board."

Board Operation

The board meets twice a year, in the spring and fall, and meetings last for about five hours. Most meetings are typically followed by a social event, in some cases involving a larger student activity. There is an executive committee and three standing subcommittees (board development, financial development and academic programs). It is clear from observing board meetings that the board members enjoy their time with each other and look forward to the times when the board meets together. Advisory boards are structured in the College of Engineering such that the school-level advisory board chair automatically serves on the college level Board of Visitors, so that each school has an advocate in that forum.

CONCLUSIONS

This effectiveness model theorizes that the effective advisory board will have all four dimensions of organizational effectiveness in place – Human Relations, Internal Process, Rational Goal and Open Systems. The core of effective board

operation is established with an environment of good working relationships, communication, sound organization, and well defined roles. On this foundation the effective board will establish clear objectives which can be accomplished using internal board member capabilities and resources, and will also use influence and relationships in the larger community to advance the interests of the educational program.

In this particular case study, all four elements of the effectiveness model were observed in operation. Specific factors seen as key ingredients for the success of this board were:

- Strong leadership by school directors who believed in the advisory board process. This was viewed as the most important ingredient for an effective advisory board relationship.
- Board membership consisting of a strong base of experienced, senior executives with a wide range of backgrounds and with demonstrated commitment to the school and the profession, along with additional members with more diversity in age, experience and culture.
- Board meetings that were well organized, with consistent follow through on input from the board, such that board members felt that their time was well spent and that they were adding value to the program.
- Explicit and well focused fund raising initiatives.

These characteristics resulted in a board that continues to be regarded as highly effective by all involved, contributing significantly to the program academically, financially, and strategically.

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